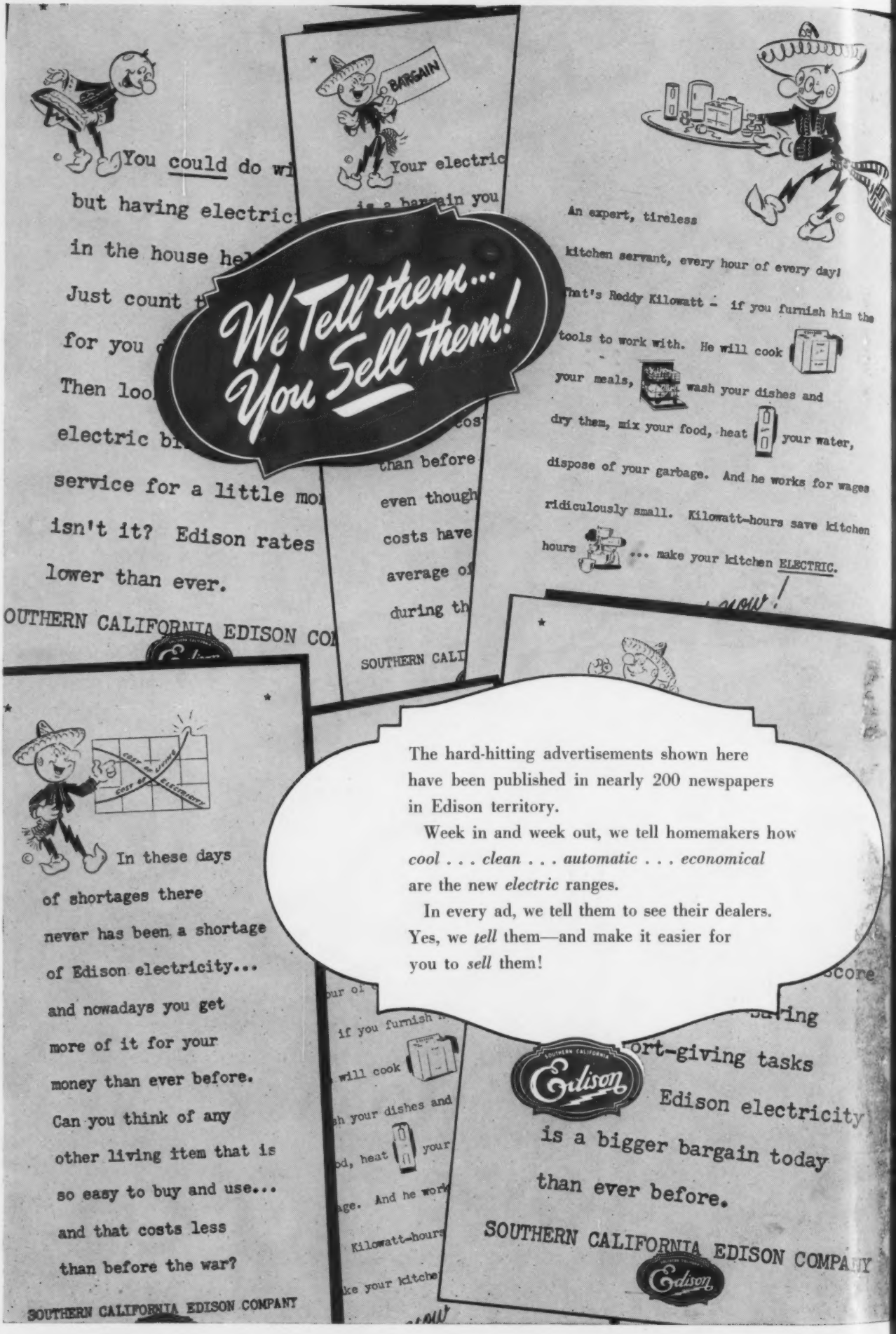
LECTRICAL
VEST

October 1947
25 cents

Industrial Section, Page 69
Appliances, Page 102

KESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

We Tell them... You Sell them!



The hard-hitting advertisements shown here have been published in nearly 200 newspapers in Edison territory.

Week in and week out, we tell homemakers how *cool . . . clean . . . automatic . . . economical* are the new *electric* ranges.

In every ad, we tell them to see their dealers. Yes, we *tell* them—and make it easier for you to *sell* them!

what's new in GE street lighting

2 new Suburban Reflectors FOR INTERSECTIONS

Here are two new suburban reflectors in the G-E line of low-cost high-efficiency street-lighting units.

THE TYPE CR 4-WAY is designed for lighting right-angle intersections where it is desirable to throw light considerable distances up and down the four approaches. The CR consists of an Alzak* processed aluminum reflector with a spun-sealed Holophane refractor. In appearance, the CR 4-Way matches the familiar Type CR 2-Way reflector.

C. H. Rex, General Electric design engineer, examines (left) the new Type CR 4-Way and Type CS suburban reflectors.

*Manufactured under Aluminum Company of America Patents.

THE TYPE CS with symmetrical light-distribution, is designed for any kind of intersection. This new unit consists of an Alzak processed aluminum reflector with a spun-sealed rippled globe.

A low-cost way to improve lighting on residential streets

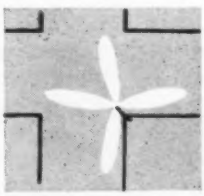
These two new reflectors, together with the Open Suburban and the CR 2-Way reflectors, enable you to choose just the kind of reflectors you need for modernizing suburban lighting.

For the most economical job, the Open Suburban, with asymmetric light distribution is ideal. Designed for installation with or without end shields, it permits complete standardization.

For a slightly higher cost, you have a choice of the three enclosed reflectors, all with spun-sealed glassware: the new CS, the new CR 4-Way, or the CR 2-Way for mid-block locations.

Since all four reflectors fit any G-E hood and insulator, you can use whatever mounting and wiring you have adopted as standard.

Because the light beams of the new CR 4-Way are directed obliquely, you get effective illumination from luminaires corner-mounted on brackets of conventional length. Span wires and long, overhanging brackets are eliminated.



GENERAL ELECTRIC

452-52

GOOD STREET LIGHTING BUILDS GOOD WILL—These new reflectors are the latest of many developments which General Electric has pioneered to help you provide better street lighting at lower cost.

For full information on these reflectors, call our nearest office or write to Apparatus Dept., General Electric Co., Schenectady 5, New York.

Are you tieing in with the NEMA plan to give America better street lighting?

OCTOBER 1947

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal", "Journal of Electricity, Power and Gas" and "Journal of Electricity". Contents Copyright. Sixtieth year of publication.

ELECTRICAL WEST

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THIS MONTH'S AUTHORS

N. B. HINSON, author of "Fuel Power Outlook, Pacific Southwest Area," p. 69, since January 1945 has been vice-president and executive engineer of the Southern California Edison Co. In addition to a number of executive engineering positions which he has previously held with the company (having been appointed chief engineer and chairman of the engineering committee in 1934) he has acted as chairman of the Pacific Southwest Power Interchange Committee.

EDWIN FLEISCHMANN, able proponent of more kilowatt-hours per worker, p. 72, is a consulting engineer specializing in utility operation, management, rates and regulatory matters, cost studies, and economic analyses. Following graduation from Harvard Engineering School and five years with Westinghouse he was with Niagara-Hudson as assistant to the president of Niagara Electric Service Corp., where he had charge of all customer service, merchandising, and development of new business. During the recent war years he was in Washington in the Office of War Utilities, as chief of the Emergency Curtailment Unit, then as deputy chief of Fuel and Allocations branch of the OWU. Immediately prior to his coming to the West just a year ago, Fleischmann had been two years with the New York firm of Gilbert Associates Inc.

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Cover photo: World's largest crane, built for San Francisco Naval Shipyard

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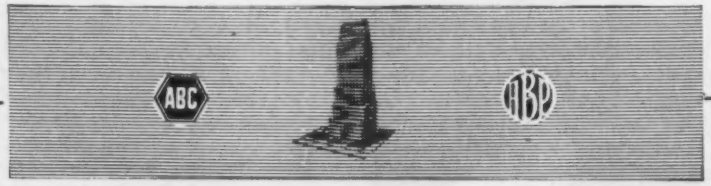

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VOL. 99 NO. 4

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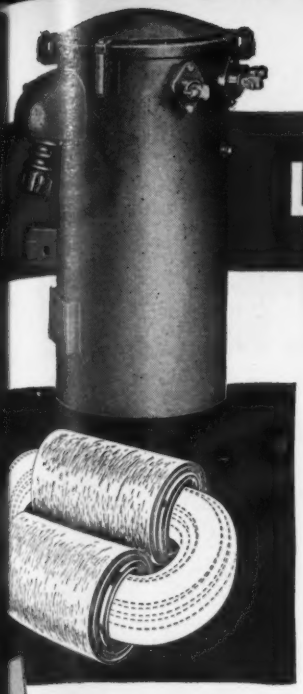
Why ROUND Coils on

L-M Round-Wound Transformers



Line Material is outstanding for its development of an economical and efficient method for using round coils on smaller transformers. This method, L-M Round-Wound construction, is an exclusive L-M method of winding round coils directly onto a wound core. It is used on transformers from 1½ to 25 kva.

Round Coils provide

High average impulse strength. In winding round coils, insulation is uniformly distributed; coil is wound tightly and evenly, in its final shape; there is no need for malleting into shape with consequent danger of damage to insulation.

High short-time overload capacity. Round coils in core type construction provide more cooling surface; there is less danger of "hot spots" under heavy loads.

Low reactance, giving better regulation at all power factors.

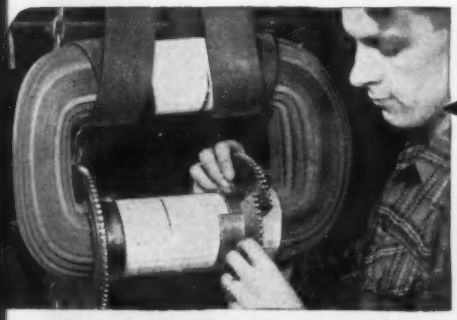
Longer transformer life. Under short-circuit currents, rectangular coils tend to assume a round shape; the forces may be violent enough to cause total failure. But *Round* coils are already round and short-circuit currents can produce very little distortion in them.

In addition to the advantages inherent in round coils, L-M Round-Wound construction provides many advantages, such as improved ratio of losses, low exciting current, good regulation, economical operation, low maintenance, and long life. It will pay you to investigate, to see why so many companies have standardized on L-M Round-Wound construction. Write for Bulletin 16-G-1, just off the press.

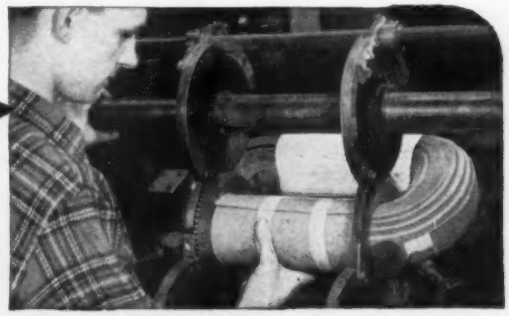
Write for Bulletin 16-G-1

Details on construction, specifications, accessories, tap changers, hangers, etc. Write Line Material Company, Transformer Division, Zanesville, Ohio.

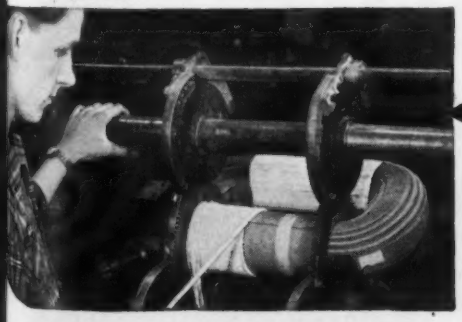
How We Wind the ROUND Coils onto the core



1 Split winding gears are placed around the taped core leg. These gears are rotated by driving gears on the winding machine. (Winding gears are removed after coil winding is completed.)



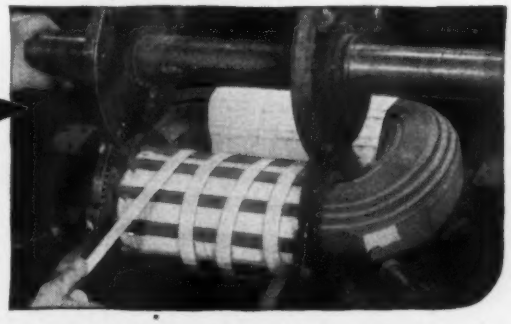
2 A tube of insulating paper is wound onto the flanges of the winding gears. This tube becomes part of the finished coil. Round coils are wound on this tube as it is rotated by the gears.



3 This simple method assures even tension, tight coils, utilizing the maximum value of the insulation without danger of damage from subsequent hammering to shape.

L-M Round-Wound Transformers are made in sizes from 1½ to 25 kva, in all distribution class voltages including 14,400 volts; they meet EEI-NEMA standards.

ROUND COILS WOUND ON CORE
REG. U.S. PAT. OFF.



4 In the larger sizes, oil duct spacers are wound into the coils, to provide passages for additional cooling oil circulation, assuring freedom from hot spots.

LINE MATERIAL
TRANSFORMERS

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters • Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street and Airport Lighting Equipment • Wired Radio Control Equipment • Capacitors

CONFIDENCE.

Manufacturers of Wire Rope and Strand • Fittings • Slings • Screen, Hardware and Industrial Wire Cloth • Aerial Wire Rope Syst
Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Ski

. . . . how much is it worth?

IN 1841, two years before the first telegraph line was installed in this country, and when there were but 27 states in the Union, John August Roebling was inspired with the idea of making a new kind of rope of unheard of strength and flexibility. His confidence in his idea caused him to risk everything he had on the development of his new rope.

How much is his confidence worth to Industry today, which couldn't turn a wheel without the modern wire rope?

Today, the John A. Roebling's Sons Company invests much time, effort and money in the development of improved products to keep alive the confidence of its many customers.

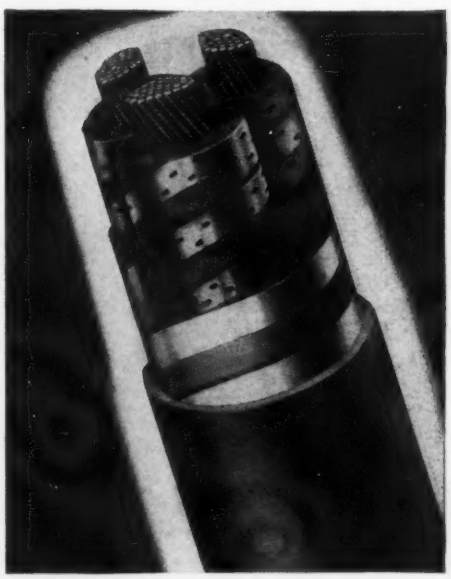
Roebling values this confidence as its greatest asset. That's why it offers you the greatest value for every dollar you invest . . . in *any* Roebling product.

FOR PERFORMANCE—UTILITY ENGINEERS TURN WITH CONFIDENCE TO ROEBLING PAPER INSULATED CABLES

AS WITH any product, the final test of Roebling Paper Insulated Cables is performance. But the confidence with which utility engineers specify Roebling cables means their performance can be predicted—in advance.

A typical example is Roebling Paper Insulated Cable (Shielded Type H) for underground power transmission. It's made of the finest available materials . . . in single or multiple conductors . . . in a wide range of sizes . . . in standard or special constructions. It's soundly designed and engineered. It is the best Roebling knows how to make.

And not only the cable commands your confidence. At Roebling, product and service go hand in hand. Experienced engineering service will help you get *all* the dependability and long life you pay for. Just call our nearest branch office and talk to your Roebling Field Engineer.



JOHN A. ROEBLING'S SONS COMPANY
OF CALIFORNIA
San Francisco • Los Angeles • Seattle • Portland

Electrical Wire and Cable • Suspension Bridges and Cables
Aircord, Aircord Terminals and Air Controls • Lawn Mowers

ROEBLING

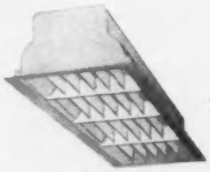
A CENTURY OF CONFIDENCE

they're easier to sell...

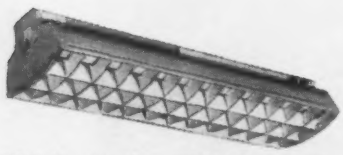
UNDER Leader FLUORESCENT FIXTURES

Millinery or motor cars, foods or furniture—all merchandise moves faster, with less sales effort, when correctly lighted. Because the Leader line of fluorescent fixtures for commercial use is complete and provides the right fixture for any installation, Leader fixtures are easier to sell, too.

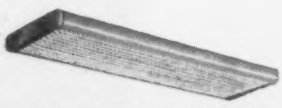
NHC—480 Leader "New Horizon" for Slim-line tubes. Creates new opportunities for modern lighting, efficiently, with low maintenance costs, versatility of surface brightness, and higher illumination values.



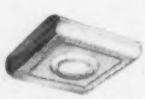
TL-240 Leader "Trofferlite." With many new and exclusive features, Leader's new Trofferlite fixtures are ideal for remodeling or for new construction. For mounting as single units or in continuous rows.



SM-240 Leader "Schoolmaster," A newly styled fluorescent fixture for schoolroom use. Optional feature is a built-in germicidal lamp. The Schoolmaster is also ideal for commercial use.



VL-440 Leader "Officer," America's most beautiful fluorescent fixture. Wafer thin. High gloss white enamel louvers assure maximum soft light diffusion. May be mounted singly or in continuous rows.



Leader Adjustable "Direclite." May be mounted above a display case in a continuous run of "Officer" units . . . or with a single unit . . . to spotlight merchandise for added sales appeal.

Better Light means Better Business

Only better electrical wholesalers and contractors distribute and install Leader fixtures.

LEADER ELECTRIC COMPANY

3500 N. KEDZIE • CHICAGO 18, ILLINOIS

WEST COAST FACTORY
2040 LIVINGSTON ST. • OAKLAND 6, CALIF.

A STEP AHEAD LEADER ELECTRIC COMPANY

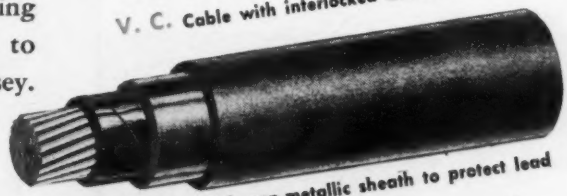
SHORT FACTS ABOUT LONG-LIVED CABLE

OKONITE VARNISHED CAMBRIC CABLES

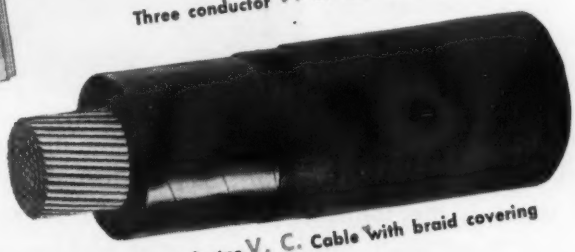
- They can carry a heavier current than rubber insulated wire.
- They are easy to splice and handle.
- They are available in all sizes and for use up to 28,000 volts.
- Bulletin OK-1013 tells the complete story of Okonite varnished cambric insulated wires and cables with illustrations, tables, and current carrying capacities. For a copy, write (using your own business letterhead, please) to The Okonite Company, Passaic, New Jersey.

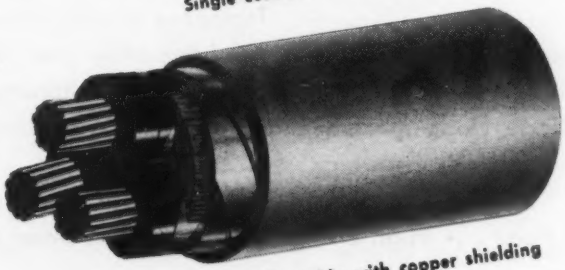
Varnished Cambric switchboard wire (flameproof braid)

V. C. Cable with interlocked armor for indoor use (Type ACV)


V. C. Cable with non-metallic sheath to protect lead

Three conductor V. C. Cable with lead sheath

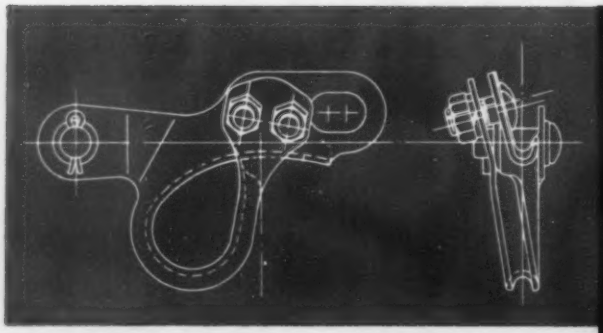

Single conductor V. C. Cable with braid covering


Three conductor V. C. Cable with copper shielding

OKONITE insulated wires and cables

BTC COMPLETE LINE OF S

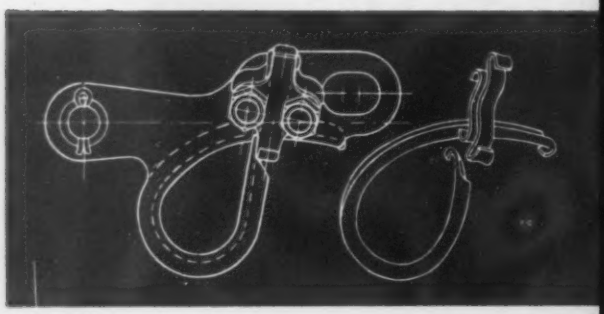
Made from High St



2106

Conductor Sizes—Max. 0.366"—Min. 0.160"

For all conductors, except A.C.S.R. Light in weight . . . economical . . . efficient. Ideal for the popular 3-Strand Composite Conductors



2107

Conductor Sizes—Max. 0.398"—Min. 0.158"

For A.C.S.R. only — Supplied with factory-assembled soft aluminum liners in body and in double-wave-grip keepers. Use of field-applied armor tape is unnecessary. Exceptional holding power.

The general design of these new Strain Clamps, for Rural, Distribution, and Light Duty Transmission Lines, is the familiar, accepted, and efficient Snail-Shell Snubbing Type.

On each clamp, the one-piece body, without welded or riveted joints, is pressed from heavy gauge Chrome-Nickle-Copper-Manganese Alloy Steel with properties assuring long service life.

Strength — High Yield Point . . . High endurance limit . . . High resistance to shock, impact, fatigue, and abrasion.

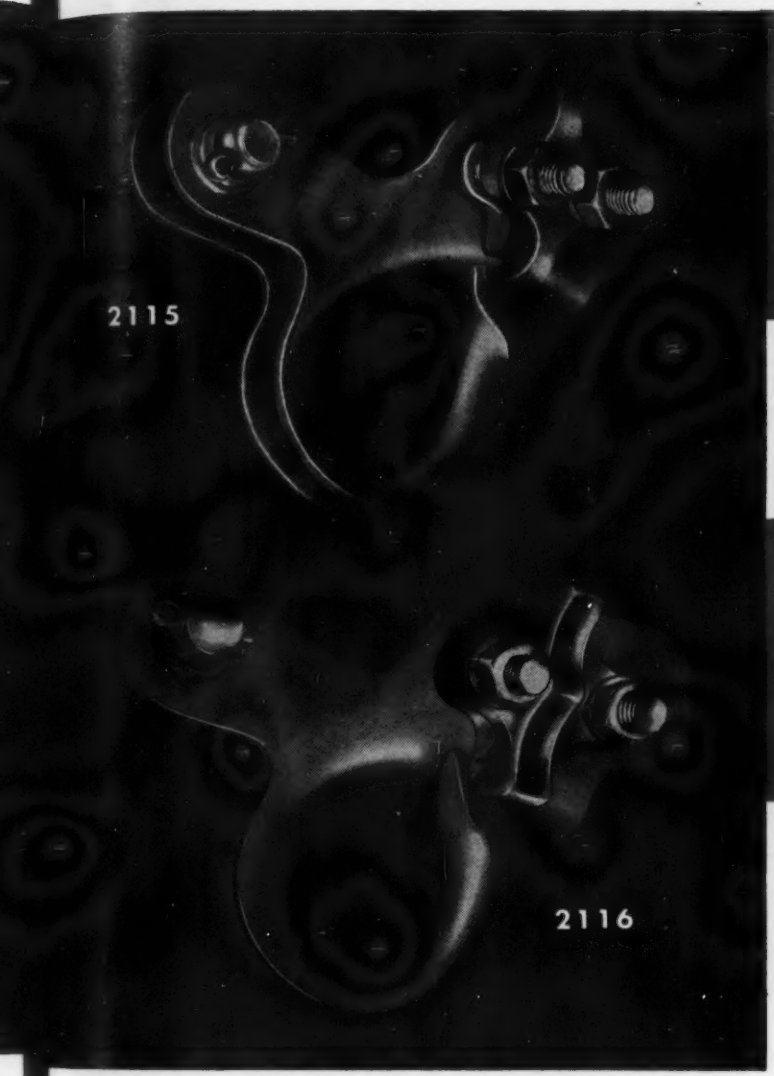
Corrosion Resistance—5 to 6 times that of mild carbon steel. Numerous tests and performance-in-use records prove the superiority of this alloy steel when subjected to severe industrial contamination, rural and seaboard atmospheric conditions, and immersion in sea water.

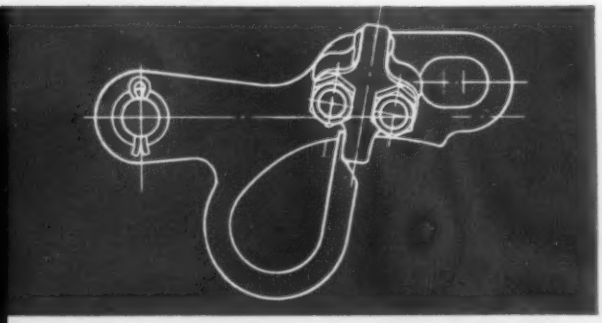
Because of these properties, this type of alloy steel has been extensively and success-

Sold only through your insulator manufacturer

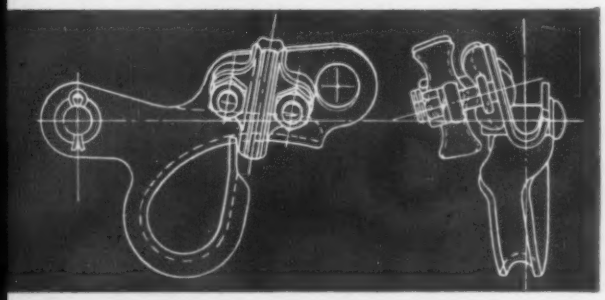
STRAIN CLAMPS

Strength, Corrosion Resisting Alloy Steel





2115
Conductor Sizes—Max. 0.4375"—Min. 0.1875"
For all conductors, except A.C.S.R. Double-wave-grip keepers assure positive holding performance.



2116
Conductor Sizes—Max. 0.550"—Min. 0.160"
For all conductors within its size range.
The use of armor tape, recommended on A.C.S.R., reduces the listed maximum cable size. This clamp with reversible, double-wave-grip keepers accommodates and holds, without slip, a very wide range of conductors. The perfect clamp for the utility regularly using several conductor types and sizes.

fully used in applications in the field of railroad, ship, and motor transportation; mining, road building, construction, excavating and conveying equipment; chemical, paper, oil, and power machinery; industrial buildings and facilities.

Excellent hot-dip galvanizing further increases the life span of the clamps. Extrusion of the metal around connecting-pin holes increases the bearing surface.

Long clamping section, smooth die-formed U-shaped cable seat and large snubbing radii prevent mechanical damage to conductor.

Light weight, short connecting length, and 6-in. cable-seat-radius at clamp mouth, minimize the effects of conductor vibration.

Each clamp develops more than adequate ultimate strength and will break, without slip, all conductors for which it is offered.

Easily applied . . . come-along loop is provided . . .only one nut need be removed and only one wrench used, except on No. 2116 with its reversible keepers.

THE BREWER-TITCHENER CORPORATION
CORTLAND, N. Y.

A Package OUT OF THE BOOK

ORDERED AND INSTALLED AS ONE COMPLETE UNIT

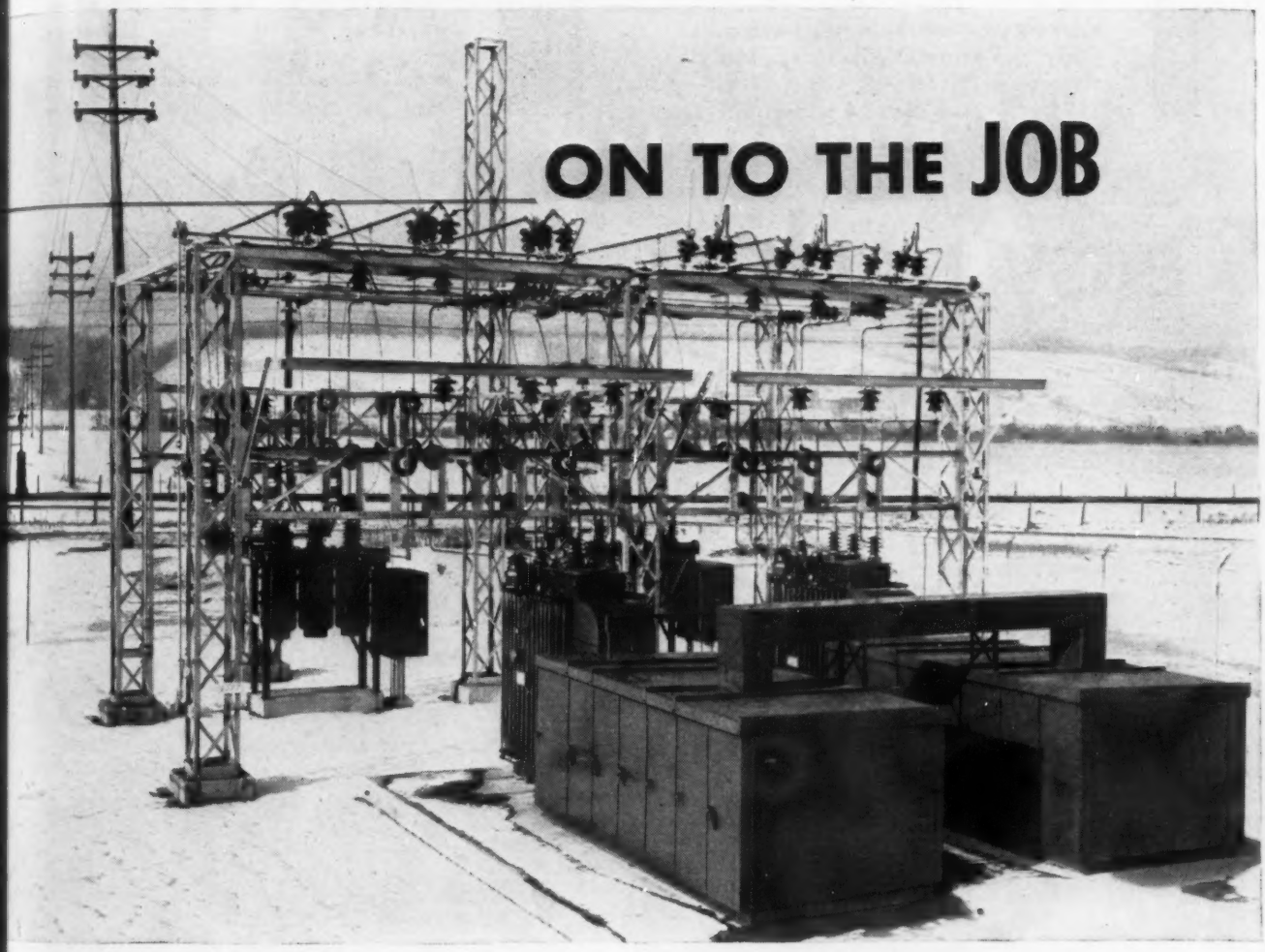
Only one order and one set of specifications were needed fo
the equipment of the above substation. Transformers, switchgear, st
work, lightning arresters, disconnects—everything but the conduit, fo
dations and enclosing fence—was ordered and installed as a

SAVED TIME—CUT COSTS

This eliminated months of costly "piecemeal" planning—mad
possible to place the order without delay. It made installation a
and easy too—the package substation was shipped in fact
assembled sections as large as shipping facilities permitted.

More and more utilities are finding it easy, economical and hi
practical to select—from the hundreds of standard designs—a c
plete package substation matched to each specific job. They fi
frees system engineers of much detail work on components, lets t
concentrate more profitably on over-all system operations.

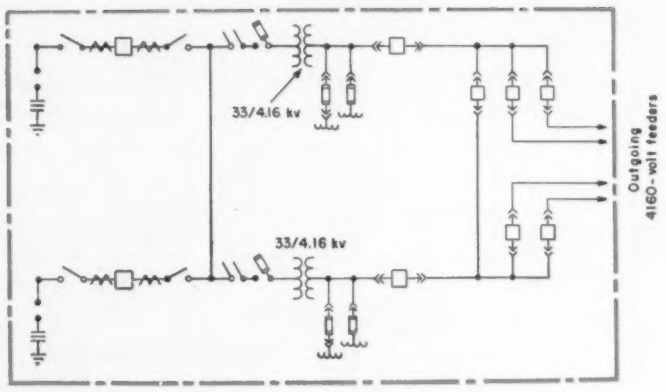
Substation . . .



E TIME AND MONEY WITH THE *UNIT APPROACH*
ET THE COMPLETE SUBSTATION AS A *UNIT.*

irty of the basic package substation arrangements shown in GEA-4500 (left, above). Use it to investi- the *unit approach* to your next substation applica- We think you'll be pleasantly surprised. Your G-E representative will gladly provide a copy and you all he can. *Apparatus Dept., General Electric* pany, *Schenectady 5, N. Y.*

PACKAGE SUBSTATION



GENERAL ELECTRIC

321-56

"LAY-IN" XTENSIONDUCT

For Wall or Ceiling Extensions

Here's the neatest thing in extensions for carrying wires along walls or ceilings. Eliminates difficult fishing through narrow channels. No ugly clips. Only the smooth, flat capping shows on finished work. **No. 111** holds two No. 14 wires.

"LAY-IN" METAL MOLDING

For On-The-Surface Wiring

It's easy to install wiring with NE Metal Molding. Screw down the base, lay-in the wires, snap on the capping.

No. 333 is only 7/16" thick, yet holds four No. 12 or No. 14 wires, or three No. 8 or No. 10 wires.

No. 888 is 11/16" thick, holds ten No. 14, No. 12 or No. 10 wires.

5 easy roads to BETTER LIGHTING

OVALFLEX ABC

Flat Armored Bushed Cable

Used for surface or concealed wiring. Only 7/16" thick. Can be installed and covered within plaster thickness. Bends flatwise and edgewise. There's a complete line of NE shallow Outlet and Switch Boxes and flat Connectors for Ovalflex.

SURFACEDUCT

The New Raceway for Industrial and Commercial Lighting

Another lay-in surface raceway (2-1/8" x 1-5/8" cross section) for use with all types of suspended lighting, cove, trough or window lighting. Banks of lights can be switch-controlled. Interconnectable with other systems. Unique bridge anchors capping and devices securely; serves as wire retainer when Surfaceduct is mounted overhead.

OVALDUCT

Rigid Oval Steel Raceway

An "in-the-surface" raceway for concealed extensions from existing outlets. Only 13/32" thick. Easily installed within plaster thickness. Electro-galvanized for protection against rust. In addition, the inside is enameled for extra smooth fishing.

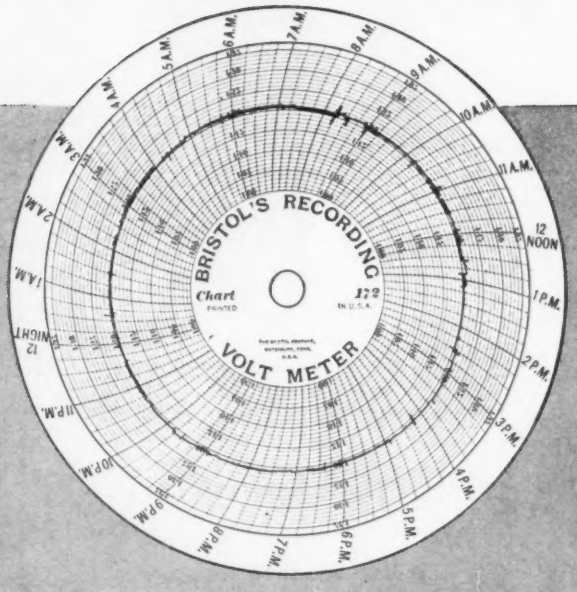
WHEN new lighting requires extensions, changes or detours in wiring systems, here are 5 approved raceways to make the job easy. Designed to meet the most exacting architectural or industrial requirements . . . Quick and inexpensive to install. Complete interconnectable fittings to take care of every situation. Write for installation data.

National Electric
PRODUCTS CORPORATION
Box 897 — Pittsburgh 30, Pa.

NATIONAL ELECTRIC PRODUCTS
NE
WIRING SYSTEMS
WIRES AND CABLES

MODERN ALLIS-CHALMERS *DFR REGULATORS

HOLD ± 1v. BAND



. . . and Use 2/3 Less Exciting Current!

Exciting Current Tells The Story

Old Type Regulator — 25%

Modern *DFR Regulator — 8%

% Excitation Current Requirements based on Regulator kva

THE ONLY COMPLETE LINE OF ⅜% STEP REGULATORS

DFR—Standard sizes for single phase regulation up to 6,900 v, 250 kva

AFR—Standard sizes for three phase regulation up to 69 kv, 750 kva

YOU CAN MAINTAIN ± 1 volt band width — without high excitation with the Modern Allis-Chalmers *DFR regulator. No other regulator gives both close control *and* low excitation. *Old type* regulators require at least 25% excitation. Think of that high exciting current in terms of cost of equipment used for unnecessary excitation of regulators . . . in terms of installed capacitors . . . at $10 per kva . . . needed to balance high exciting current.

Compare! Compare with the Allis-Chalmers *DFR regulator . . . the regulator that holds a ± 1 volt band, yet requires but 8% excitation . . . 2/3 less than any other single phase regulator. Then investigate the Modern DFR step type regulator. More than 14 years of use in regulating over 5,000,000 kva has proved the principle of step regulation sound—the design rugged.

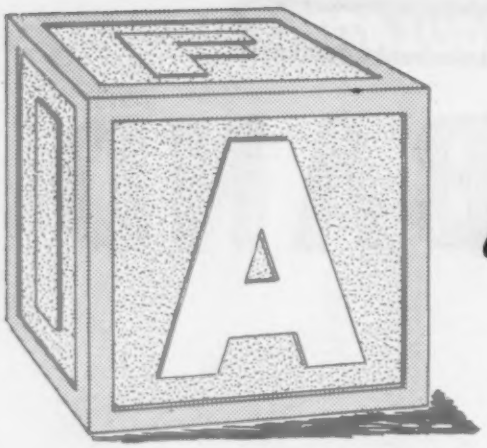
For further details on how you can save 2/3 of excitation current, call your nearby A-C office, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2308

* **DFR** — the only station type step regulator you can buy for single phase duty

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great



is for ANHYDROPRENE

the up-to-date product designed to replace braided, taped, and other fibrous-covered cables. **A** is for its many and varied applications and **A**, too, represents its money-saving advantages.

Featuring the exclusive ANHYDREX insulation and a tough neoprene jacket, Anhydroprene wires can be your assurance of dependable, unfailing service at less cost per hour of operation. Ask the Simplex representative in your area, or write us direct, for full details.

APPLICATIONS...

- Plant and shop wiring
- Control circuits
- Underground primaries
- Transformer leads
- Pole line risers
- Instrument wiring
- Mine service

ADVANTAGES....

- Light weight
- Small diameter
- No braids to rot
- High moisture resistance
- Resists oil, alkali, sunlight and flame
- Resists acids and corrosive chemicals
- Easily pulled into ducts
- Flexible at low temperatures
- Easy to splice
- No potheads required

SIMPLEX

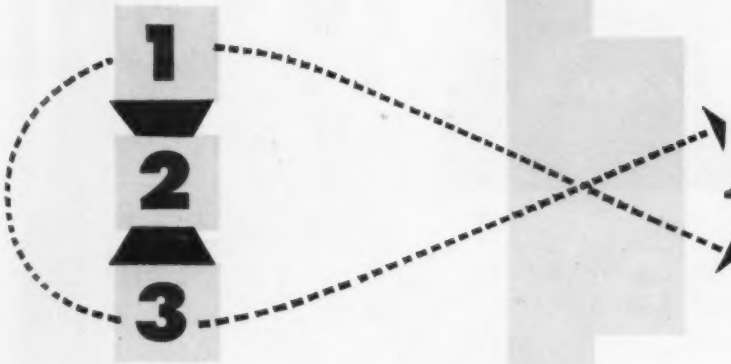
WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

1. SAFETY

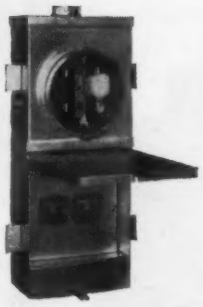
2. ADEQUACY

3. FLEXIBILITY



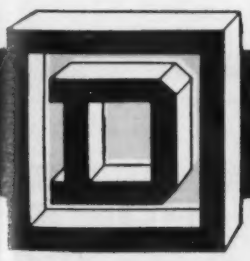
RO 92 Service Entrance Device Provision for two meters.

SQUARE D PROVIDES ALL THREE.....FOR THE HOME WITH A FUTURE!



RO 20 Service Entrance Device Provision for one meter.

One compact unit provides safe electrical control; adequate distribution of electrical load; and flexibility of circuit arrangement. The non-tamperable Multi-Breaker unit eliminates fuse replacement and offers complete control of all appliances in one unit. The unit provides for 37 different circuit arrangements. The raintight enclosure housing the Multi-Breaker and meter space can be mounted surface or semi-flush.



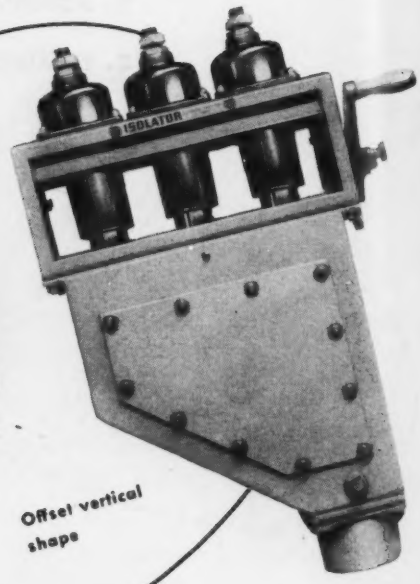
SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D CANADA, LTD., TORONTO, ONTARIO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

THE CABLE ISOLATOR PROVIDES THE MODERN MEANS

for terminating and disconnecting lead sheathed power cables



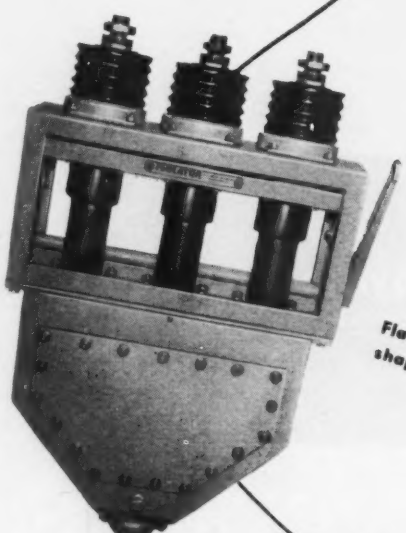
Offset vertical shape

The CABLE ISOLATOR consists of a pothead body combined with the well known THREE E ISOLATOR into one compact assembly. It therefore,

SAVES ***Material*** ***Space*** ***Installation costs***

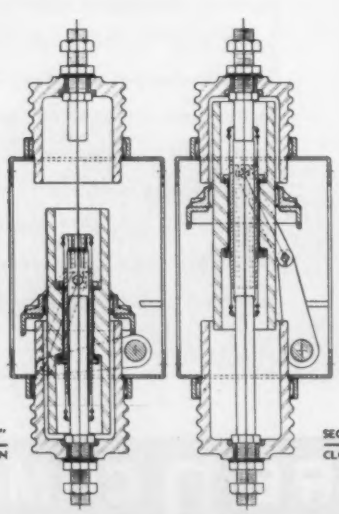
The pothead body is of welded steel construction and equipped with our exclusive removable cover plate which facilitates installation of cable. One operation disconnects all phases simultaneously and holds them disconnected without use of dummies, dummy caps and other auxiliaries.

CABLE ISOLATORS are supplied for voltages to 15 kilovolts and in six different body shapes to fit various mounting conditions and cable runs. Nine styles of cable entrances are available.



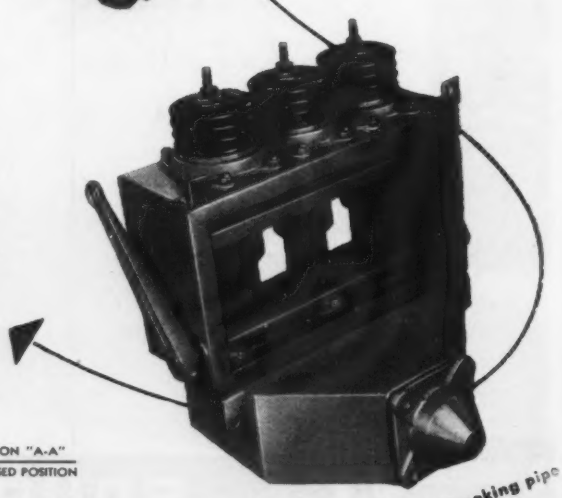
Flat vertical shape

Cross sectional view through ISOLATOR



SECTION "A-A" OPEN POSITION

SECTION "A-A" CLOSED POSITION



Smoking pipe shape

THREE E ELECTRICAL ENGINEERS EQUIPMENT CO. MELROSE PARK, ILL. U.S.A. THE MARK OF QUALITY

ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK ILLINOIS

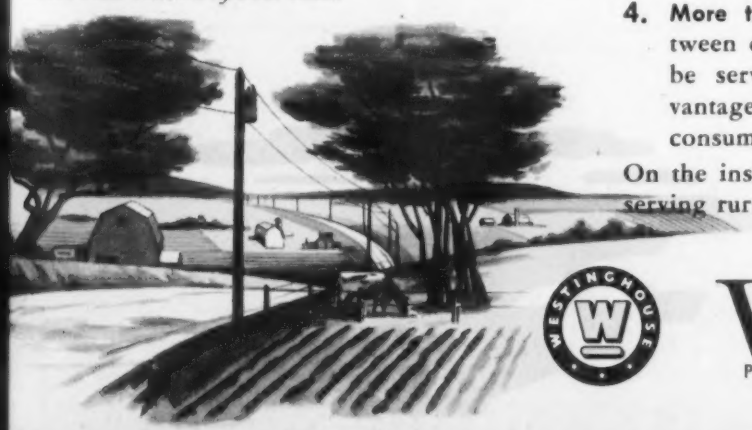
POWER DISTRIBUTION PLANNING

for Better Service Lower Costs...

Rapid load growth, scarcity of electrical apparatus and the lack of time for adequate planning have necessitated piecemeal expansions of many distribution systems. The result has often been lack of co-ordination in the various parts of the system, lowered quality of customer service—and in many cases, resulted in excessive operating costs.

As designer and manufacturer of a complete co-ordinated line *of distribution apparatus, Westinghouse is in an excellent position to offer correlated planning and engineering service—for* any *type of system development or extension.*

This is the first of a series of system layouts, showing how Westinghouse equipment can be applied—to improve system operation, increase reliability of service and reduce system costs.



Farm and rural load growth has exceeded all expectations. In addition, within the next few years, many more farm and rural users will be served with electrical energy. Here's an increase in load on which advance planning should really pay off.

Several characteristics of this load must be considered:

1. **Light load-density.** The peak load per square mile, or per mile of line necessary to reach the loads, is relatively small.
2. **High individual load.** Individual rural users often have several times the peak load of an urban residential consumer.
3. **More miles of line per kva of peak load.** Distance between consumers is many times that of residential consumers—requiring many more feet of line per kva of peak load.
4. **More transformer capacity required.** Distance between consumers usually permits only one user to be served from a distribution transformer. Advantage can seldom be taken of diversity between consumers to reduce transformer capacity need.

On the inside pages are specific recommendations for serving rural areas with maximum economy.

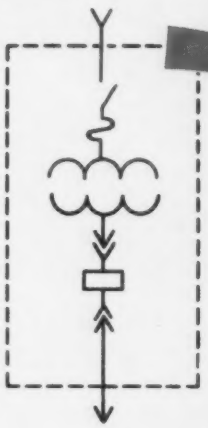
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Simplified System Layout . .

. . . . dual keys to lowe

DISTRIBUTION SUBSTATION

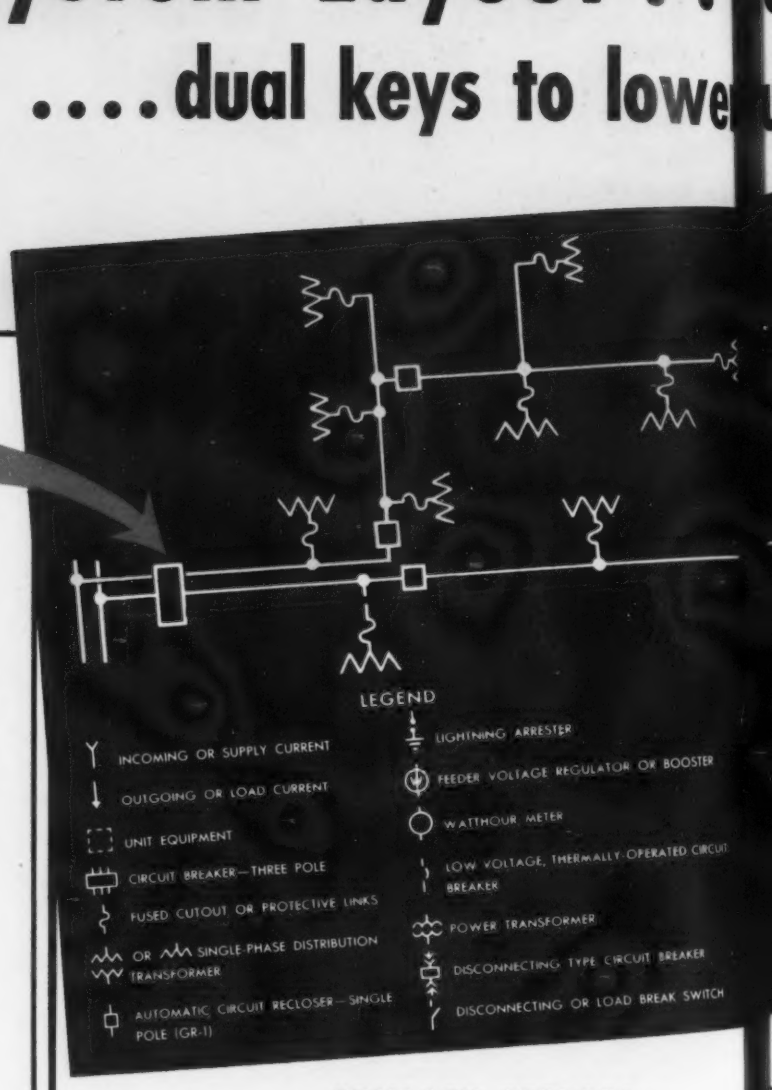


Reliability of the over-all radial system starts right at the substation supplying the power.

In the past it has been necessary to construct conventional substations consisting of transformers and structures for mounting many associated items.

By comparison, the Westinghouse CSP Power Transformer, a self-contained substation, reduces installation cost and increases reliability over the conventional type. This is ideal for any areas requiring a single-feeder substation above 500-kva capacity.

Substations of smaller capacities are of the conventional types requiring power fuses, disconnects, arresters, breakers, etc. Over-all reliability of this type of substation depends upon the quality of these many different, integral parts.

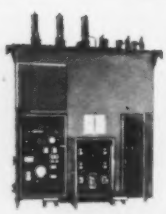


PRIMARY FEEDERS

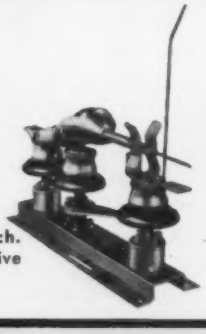
Utilities have found that rural areas are best served by simple radial systems, consisting of one or more primary feeders.

Due to their length in rural areas, these primary feeders are subjected to greater exposure to the elements than any other type of feeder. Still, the first cost, maintenance and operating cost must be kept to a minimum and, at the same time, render high-quality service.

Faults, either temporary or permanent, must disturb a minimum of customers. Proper voltage

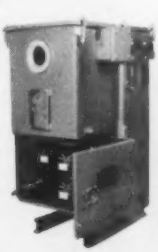


Westinghouse Single-Feeder Substation. Contains CSP Power Transformer and switchgear in preassembled unit. Details in booklet B-3238 and Descriptive Bulletin 48-100.



Westinghouse Type V Disconnecting Switch. Described in booklet B-3480 or Descriptive Bulletin 36-160.

New Westinghouse GR Automatic Circuit Recloser. For details, ask for Descriptive Bulletin 38-680 or booklet B-3906.

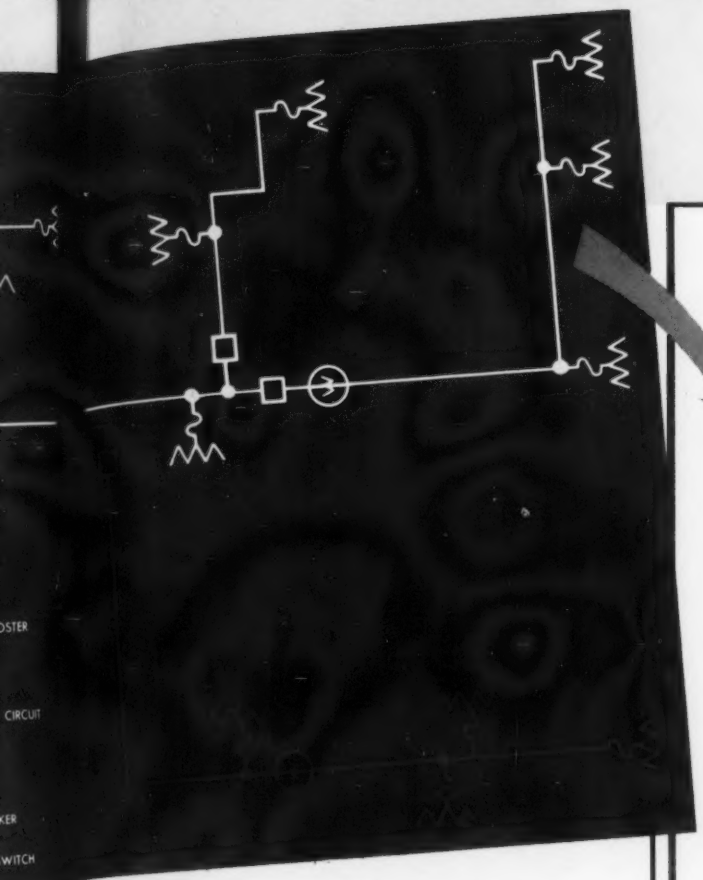


Westinghouse Type LR Booster Voltage Regulator. Described in Catalog Section 47-230. Ask for a copy.

WESTINGHOUSE DISTRIBUTION APPARATUS

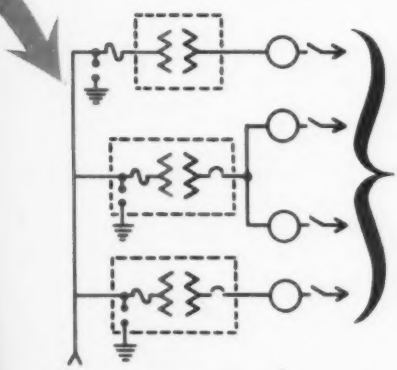
. orrelated Quality Equipment

we ural distribution costs



gulation, from the viewpoint of customer re-
ions or the operation of their equipment, is
t as important as it is in any other area.
The Westinghouse Type GR Recloser, de-
ibed on the next page, properly applied as
dicated above, minimizes the effects of either
mporary or permanent faults. Proper co-ordi-
ion of reclosers and fuses saves many costly
vice trips.
Westinghouse Type BR or LR Voltage Regu-
ors, installed on rural lines, prevent low volt-
e, consequent poor service to customers and
s of revenue.

DISTRIBUTION TRANSFORMERS AND SECONDARY SERVICES



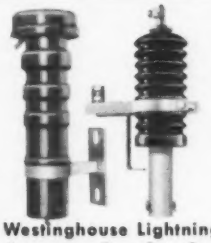
The distribution transformer must be able to take all the punishment that may be delivered to it both from the primary feeder and from the customer services.

General acceptance of the Westinghouse CSP (Completely Self-Protecting) Distribution Transformer by the majority of operators is evidence that it is best qualified to maintain this connection between the primary feeder and the consumer *at minimum cost.*

In applications involving the conventional use of Transformers, the Westinghouse type "S" Transformer protected by the "EA" drop-out fuse cutout and valve or "De-ion" type arrester is a well co-ordinated combination.

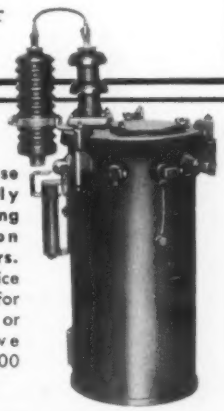
The meter is the cash register of the system. Westinghouse Type CA or CS Meters assure a square deal for both the utility and consumer.

Westinghouse Type EA Fuse Cutout, Type UT and Super Surge Fuse Links. Described in Catalog Sections 38-625, 38-665, 38-668 and booklet B-3833.



Westinghouse Lightning Arresters. See Cat. Sec. 38-140, Descriptive Data 38-205 or booklet B-3417.

Westinghouse Watthour Meter —Details in Catalog Sections 42-000 or booklet B-2247.



Westinghouse Completely Self-Protecting Distribution Transformers. Ask for Price List 46-100 for full details, or Descriptive Bulletin 46-100 CSP.

US A COMPLETE AND CORRELATED LINE

New GR Reclosers...

WORK 2 WAYS TO CUT YOUR DISTRIBUTION COSTS

GR Reclosers provide a choice between four time-lag tripping operations or 2 fast, followed by 2 time-lag, tripping operations. *And the change from one to the other can be made in a few minutes in the field.* This exclusive GR feature enables you to establish better co-ordination between reclosers—and between reclosers and fuses—than heretofore possible. The result is a minimum of system miles affected by any fault . . . a minimum of outage time on all parts of the system including long, lightly loaded lines where faults are common and service trips costly.

These Features...

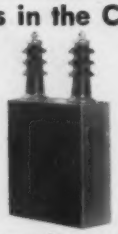
- **Choice** of all time-delay trips or 2 fast and 2 time-delay trips (quick change-over in the field).
- **Dead tank construction**—no live parts exposed.
- **Time-delay tripping** on reclosing after lockout.
- **Direct-drive mechanical integration** . . . no pumps . . . no clockwork.
- **Self-protection**—no coil burnouts from overload or lightning.

...mean these advantages!

- **Positive co-ordination** of a series of as many as seven reclosers—or reclosers and fuses.
- **High-speed (12-cycle) reclosing** after first fast opening.
- **No unnecessary tripping** on momentary overloads.
- **Line pick-up after lockout** without by-pass switch.
- **Minimum** of system miles affected by any fault.

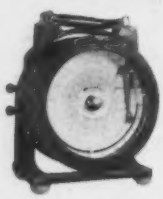
Other items in the COMPLETE Westinghouse line of Distribution Apparatus

Type DBA (Drop-out Boric Acid) Fuses. Price List 36-325 or booklet B-3419.

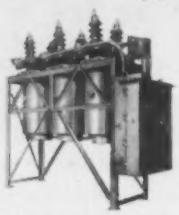


Capacitors for power-factor correction. Catalog Sections 49-000 or booklet B-3204.

Instrument Transformers for all metering and relaying. Catalog Sections 45-000.



Instruments for any purpose. See Catalog Sections 43-000.



Oil Circuit Breakers—outdoor, automatic reclosing type. Catalog Sections 33-752.

Street Lighting—Complete equipment of all types. Catalog Sections 60-000.

HERE'S CONSTRUCTIVE HELP FOR DEVELOPING RURAL LOADS

For maximum use and enjoyment of electricity on the farm, wiring must be adequate. This fact-filled, 44-page book has been compiled as a guide for utilities to help farm dealers, wiring contractors and farmers in planning adequate farm wiring to take care of requirements. It contains helpful data on voltage drop, wiring plans and uses of electrical equipment, which is useful to County Agents, Vocational and Agricultural teachers and utility farm power engineers. It is available, at low cost, for use by utilities. Write for sample copy. Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-97121

Litho in U.S.A.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

DISTRIBUTION APPARATUS

A COMPLETE AND CORRELATED LINE

BURNDY

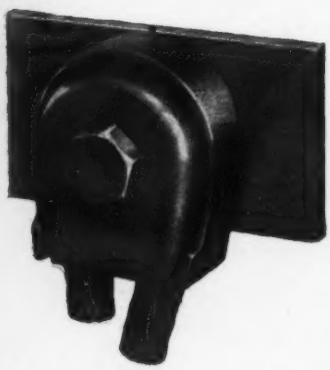
connectors for GROUNDING

GR — For joining ground lead at right angles to driven rod or pipe.

Burndy ground connectors are available for use on driven rod, pipe, tower legs, fence posts, oil storage tanks, transformers, breakers, etc. These sturdy mechanically strong ground connectors are made from high copper content, corrosion resistant alloys. Specify "Burndy" for your important groundings. Write for details.

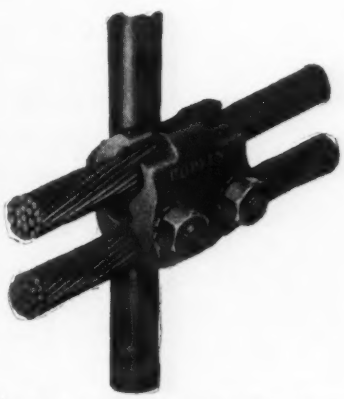
BURNDY — New York 54, N. Y.

In Canada: **Canadian Line Materials Ltd., Toronto 13**
Foreign: **Philips Export Corporation, New York 17**
WESTERN BRANCH • VERNON, CALIFORNIA

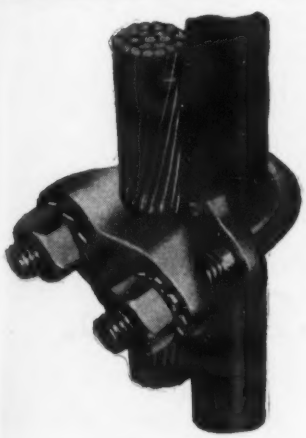


GZ — For joining grounding wire or cable to flat bar, tower legs, etc.

GG — For joining flat braid or bar to switch operating pipe handle or fence post.



GP — For joining two ground conductors at right angles to driven rod or pipe.



GA — For joining ground lead parallel to driven rod or pipe.

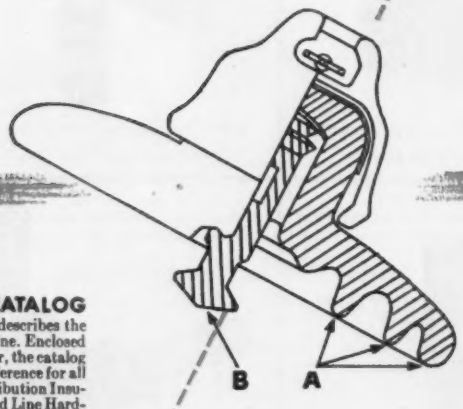
GB — For joining ground lead to flat bar or angle iron.

GX — For joining two crossing ground conductors.

THOMAS details make a big difference in insulator life

No one part of an insulator is more important than another. Long life is dependent upon the proper balance of all electrical and mechanical characteristics. This attention to detail and manufacturing "know-how" does not come overnight. Thomas has been manufacturing porcelain insulation for 74 years and is still seeking better and improved methods of serving the electric utility industry . . . is still refining its products for more efficient insulation of transmission and distribution lines.

To you as a user of insulators, these refinements mean extra years of trouble-free performance. Specify Thomas Porcelain for all your insulator requirements . . . There are no "weak links" in Thomas Insulators.



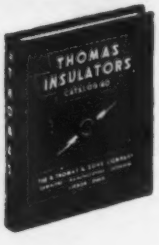
This cutaway view is a Thomas Ten-Inch Suspension-Strain Insulator, 15,000 pounds M. & E. rating. Illustrated are two of the many plus characteristics evident in all Thomas made porcelain insulators.

A—Corrugations are rugged and thick . . . tough enough to withstand malicious or accidental breakage. Deep and rounded, they provide maximum leakage surface. Rolled edges prevent chipping and breakage. Thomas design is right . . . Thomas porcelain is tough.

B—Forged steel studs are set and held fast by high grade cement. Perfect alignment is assured, for all parts are jig assembled . . . clamped tight until cement sets. Complete interchangeability, uniform quality and long life are guaranteed with Thomas Insulators.

THIS FREE CATALOG

. . . illustrates and describes the complete Thomas line. Enclosed in a loose-leaf binder, the catalog provides a ready reference for all Transmission-Distribution Insulators and Associated Line Hardware. New insertions as issued are sent to all catalog holders.



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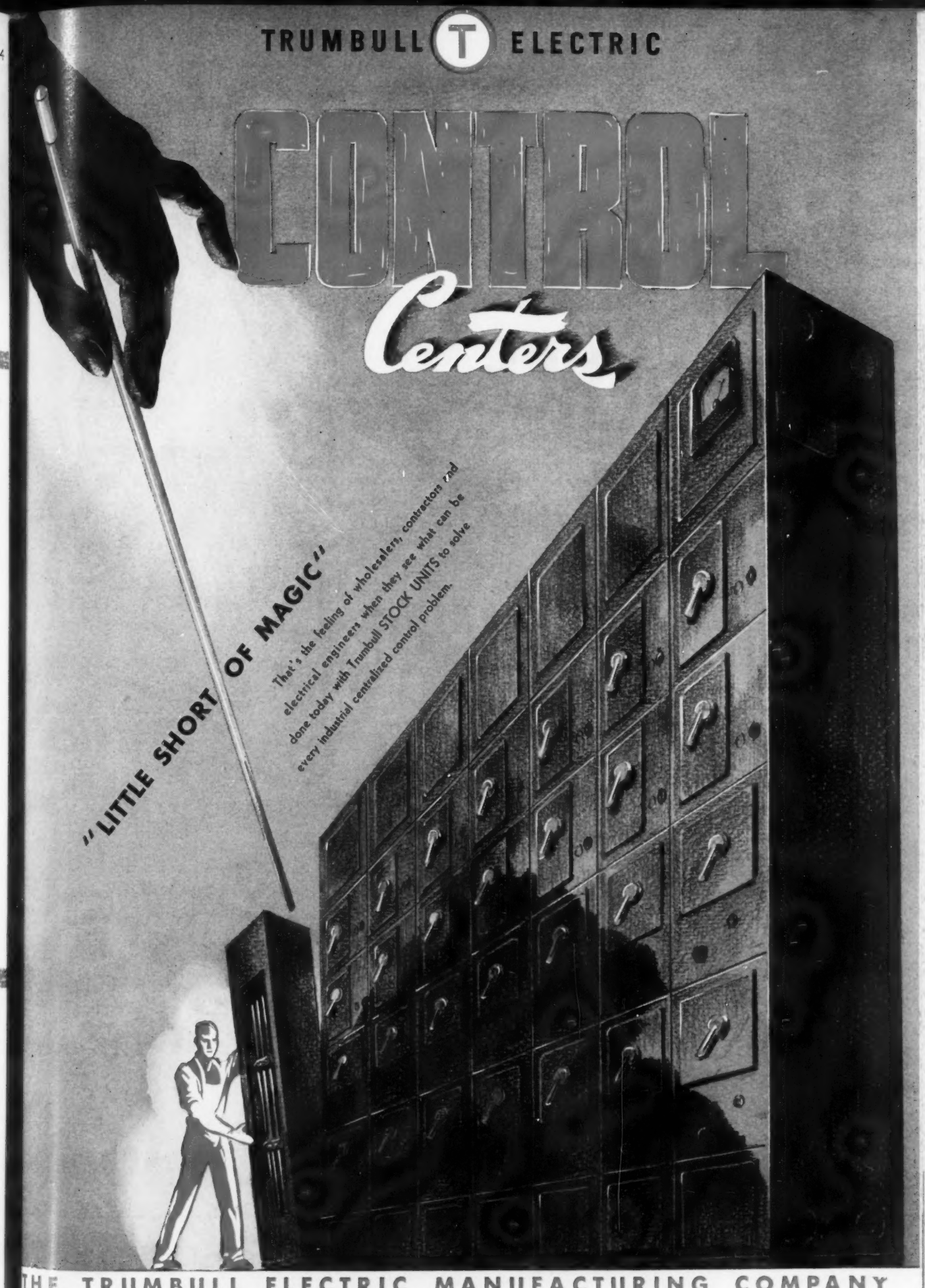
TRUMBULL T ELECTRIC
CONTROL
Centers
"LITTLE SHORT OF MAGIC"
That's the feeling of wholesalers, contractors and electrical engineers when they see what can be done today with Trumbull STOCK UNITS to solve every industrial centralized control problem.

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THE BIG DIFFERENCE is in YOUR COSTS!

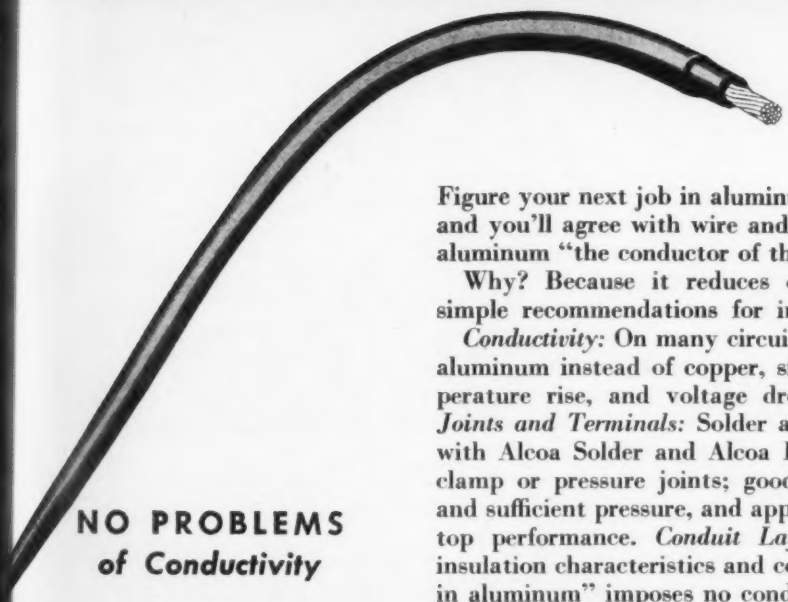
ALCOA REG T M

ALCOA EC ALUMINUM

FOR ELECTRIC WIRE AND CABLE

ALUMINUM

gives you everything you want in a conductor— cuts a big chunk off your distribution investment!



NO PROBLEMS *of Conductivity*

NO PROBLEMS *of Joints and Terminals*

NO PROBLEMS *of Conduit Layout*

NO PROBLEMS *of Availability*

Figure your next job in aluminum! See how much it cuts your costs, and you'll agree with wire and cable manufacturers who are calling aluminum "the conductor of the present and future".

Why? Because it reduces over-all wiring costs. Here are the simple recommendations for installing it:

Conductivity: On many circuits, it will be sound engineering to use aluminum instead of copper, size for size. Type of insulation, temperature rise, and voltage drop will be the determining factors. *Joints and Terminals:* Solder aluminum to itself or to other metals with Alcoa Solder and Alcoa Flux, using standard methods. Make clamp or pressure joints; good practice calls for generous contact and sufficient pressure, and application of joint compound for lasting top performance. *Conduit Layouts:* A comparison of wire sizes, insulation characteristics and costs will show you that a job "figured in aluminum" imposes no conduit problems. And aluminum's lightness makes it easier to pull.

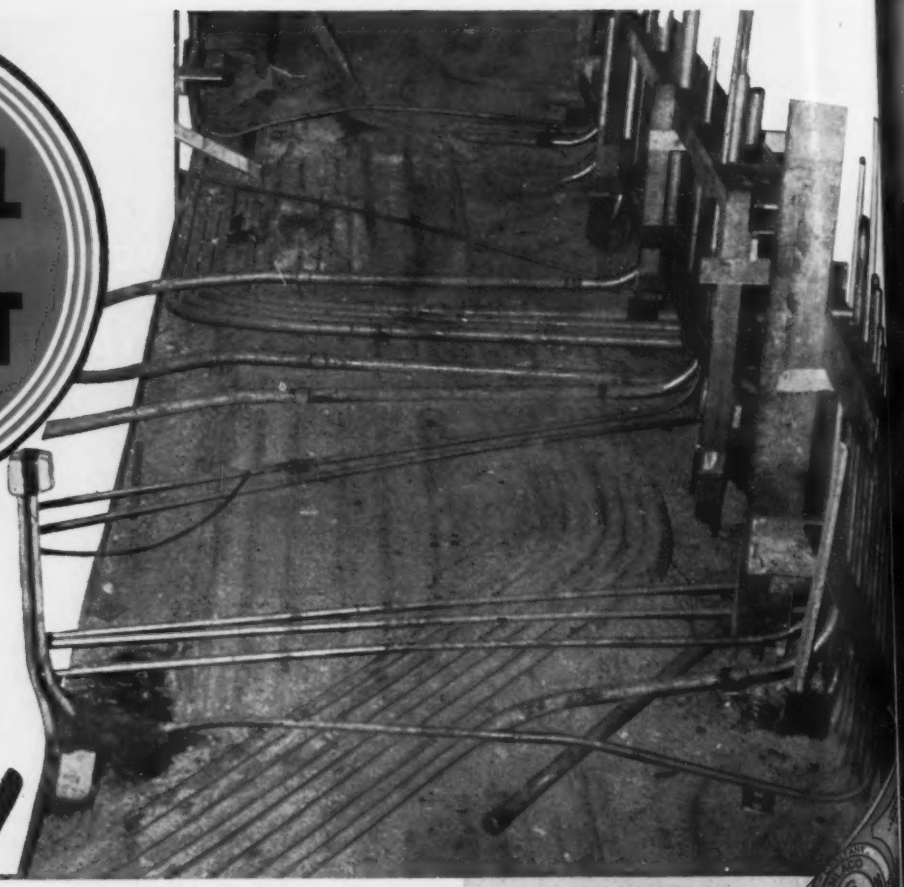
Your wiremen will like the lighter weight of wire and cable made of Alcoa E. C.* Aluminum. For instance, the weight of a 500 mcm insulated aluminum cable is less than half the weight of an identical copper cable.

Aluminum conductor is here to stay. The advantage of "figuring it in aluminum" will accrue first to those utilities who are quickest to adapt this modern metal to new or modernized distribution systems. Ask your wire and cable supplier, or write us for further information. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in principal cities.

Insulated and sold by leading wire manufacturers

*E. C.: Electrical Conductor Aluminum

CENTRAL SPANG CONDUIT



Stops waste!

Contractors tell us that, on job after job, Central Rigid Steel Conduit prevents the loss of valuable material.

Here's why. Its strong and full weight walls resist mechanical injury caused by wheelbarrows, nails, etc. It's so sturdy and yet so ductile that stubs, if bent, can be easily straightened without danger of cracking or breaking . . . and its smooth inside surface permits wires or cables to be pulled through or withdrawn quickly without damaging insulation.

Central Conduit is handled by a distributor near you. When you call him he will do everything he can to make deliveries as quickly as possible in spite of today's unprecedented demand.

"There's Tested Strength in Every Length"

CENLACO has a hot dipped galvanized and lacquered finish.

CENTRAL WHITE has an electro-galvanized outside finish and a black enameled inside finish.

CENTRAL BLACK has a permanent, baked-on black enamel finish.

• SPANG-CHALFANT

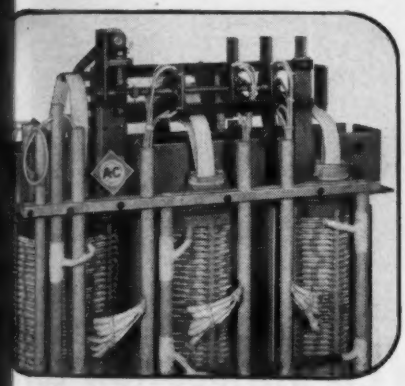
Division of The National Supply Company
General Sales Office: Grant Bldg., Pittsburgh 30, Penna.
District Offices and Sales Representatives in Principal Cities

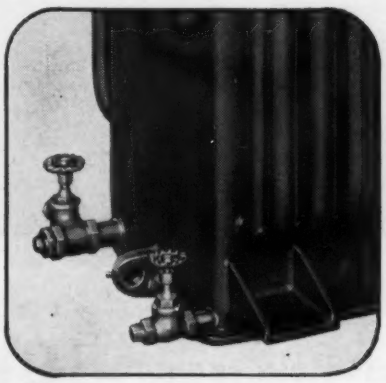
Choosing Network Transformers?

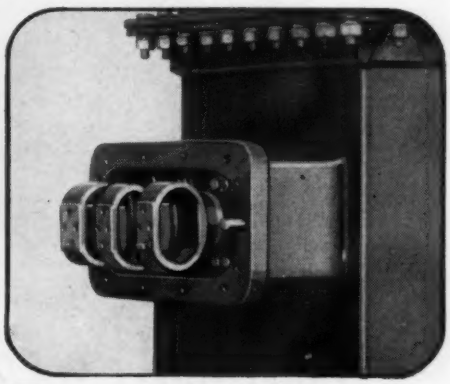
Allis-Chalmers Improved Units Meet Any System Need!

1 THEY'RE SMALLER IN OVERALL SIZE — without any reduction in rugged design typical of this class of transformers. They can be designed to meet any system specifications — size, electrical characteristics, mechanical features, etc.

2 HIGH VOLTAGE SWITCH is interlocked for complete safety. Operating handle is located on side of case, and can be padlocked. A toggle prevents throwing switch through transformer position when moving from open to ground or vice versa. A 2294







3 COMPACTLY DESIGNED! Rugged circular core and coil design — outside core clamping bolts, sturdy turn-to-turn insulation — withstands heavy short circuit stresses. Thermal capacities are high, even under the most severe load conditions.

4 ABOVE, LEFT is drain valve, complete with sampling device. The valve is of a convenient size to also serve as a bottom filter press connection. At lower right is the top filter press connection and valve. Note the convenient, sturdy jacking bosses.

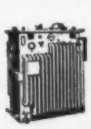
5 THIS LOW VOLTAGE THROAT in Allis-Chalmers improved network transformers is designed to fit any standard network protector. Result: you can "team" the *best* protector with the transformer *you* want! Consult, ALLIS-CHALMERS, MILWAUKEE 1, WIS.

TRANSFORMERS ALLIS-CHALMERS BUILDS:

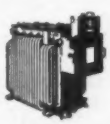
POWER — 500 kva to largest. Dry-type or liquid-filled.

½% STEP REGULATORS — single phase 2.4 to 15 kv; 3-phase 2.4 to 69 kv.

DISTRIBUTION — 1½ to 500 kva. Pole, vault, subway, substation and dry-types.



LOAD CENTER— 100 to 2000 kva. Dry or liquid-filled. Indoor or outdoor.



NETWORK—150 to 1000 kva. Vault or subway types.

FURNACE — Indoor or outdoor. Water or self-cooled. All ratings.

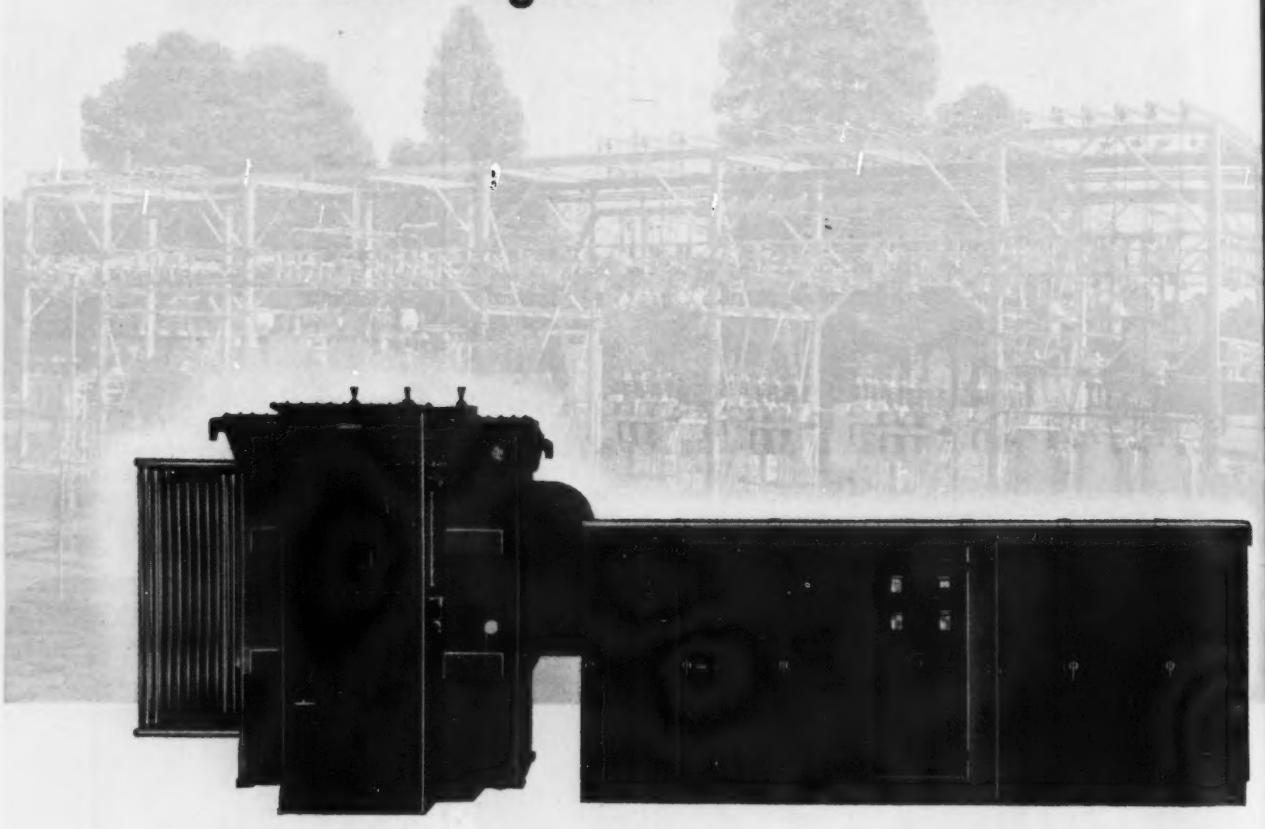
INSTRUMENT — potential, current, and signal, indoor and outdoor types; outdoor metering. Standard voltages.

ALLIS·CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

POWER DISTRIBUTION ECONOMICS
with Westinghouse Unit Substations



ACCESSIBILITY
COMPACTNESS } **Low Cost Maintenance = LOWER DISTRIBUTION COST**

Low-cost maintenance and operating safety are important requirements fully met by Westinghouse Unit Substations. Doors and easily removable barriers permit ready access to all the equipment requiring inspection and maintenance. Operating safety is provided through carefully designed system barriers and interlocks.

Co-ordinated design plus "Unitized" switchgear units simplify increasing station capacity. Compactness with adequate accessibility means . . . lower real estate costs . . . pleasing appearance . . . ease in inspection and maintenance. Super-structure and overhead circuits are kept to a minimum . . . thus further reducing maintenance and inspection time.

Whether you are planning an expansion or reconversion, Westinghouse power distribution engineers are ready to help you. Call your nearest Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-97129

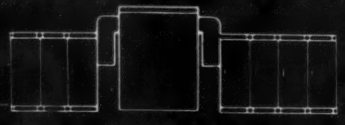
ADD UP THESE

Advantages

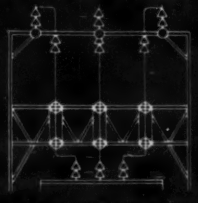
YOUR ANSWERS TO BETTER DISTRIBUTION PLANNING

1. **Lower maintenance cost . . .** upkeep time and costs are reduced as compared to the open, structural-type substation.
2. **Modern . . . pleasing appearance.**
3. **Compact . . . saves space.**
4. **Minimum installation time and cost.**
5. **Improved Service Continuity.**
6. **Undivided Responsibility . . .** complete electrical and mechanical co-ordination.

INCOMING LINE FACILITIES TO MEET EVERY REQUIREMENT...

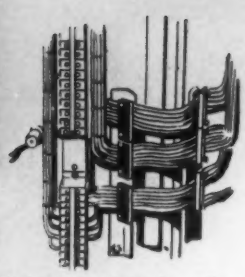


—When required Unit Substations can be supplied with coordinated, metal clad "Unitized" switchgear for incoming power supplies of 13,800 volts and below.

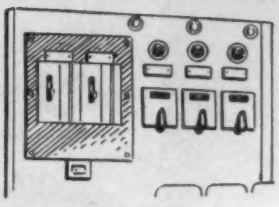


—Prefabricated overhead incoming line structures.

—Transformer mounted terminal chambers or switches for use with underground cables.

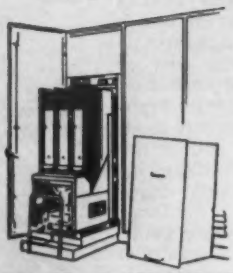


STANDARD WIRING makes it easier to trace circuits. Note how wires crossing from panel to stationary door are braced to prevent excessive wear.



LOADING-BY-COPPER TEMPERATURE RELAY—makes more overload transformer capacity safely available—guards transformer winding at all times.

INERTAIRE EQUIPMENT maintains a *nitrogen* atmosphere above transformer liquid at all times forming an inert gas "cushion"—prevents oil deterioration.



BREAKER IS REMOVABLE, in minutes — with full safety to operator because each movement follows an interlock-protected sequence.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

UNIT SUBSTATIONS FOR ANY SYSTEM

Who looks at switches, anyhow?

ELECTRICIANS, operators and the people who build them know why BullDog Vacu-Break Switches are superior. Engineers know too!

But if you're a plant executive, it may be all Greek to you. And that's as it should be. The only switch that interests you is one that won't work—one that causes costly shutdowns on the production line and expensive delays for maintenance and repairs.

Forget these problems! You can do it the minute BullDog switches take over as the guardians of your circuits.

You can reach a BullDog Field Engineer as easily as you reach for your 'phone. He'll welcome the opportunity to give you full technical details and show you a BullDog installation near your own plant. Or, write BullDog direct for descriptive, detailed folders.

1 ELECTRICIANS DO! And the first thing they see about a BullDog Vacu-Break Safety Switch is ample wiring space that makes their job of installation easy—without damaging cable insulation and without skinning their knuckles. They notice, too, that front operation allows "ganging" without waste space. Finally, they spot the durable construction that means fewer repairs.

2 OPERATORS, TOO! They like BullDog's rugged, rocker-type handles—easily accessible and built to take years of tough usage. They appreciate quick-action mechanism that assures positive "ON and OFF" operation, plus bolt-tight "Clampmatic Contacts." And best of all, they know that "safety" is more than a word with BullDog.

3 AND SO DO THE PEOPLE WHO MAKE THEM! There's a certain satisfaction in building a product you know is good. And that's the sort of satisfaction BullDog craftsmen feel when they work with high-grade materials to execute modern designs. At the end of the production line, BullDog inspectors see a switch that's engineered and built for long, trustworthy service—and good-looking, too.

BullDog manufactures Vacu-Break Safety Switches—Saf-ToFuse Panelboards—Superba and Rocker Type Lighting Panels—Switchboards—Circuit Master Breakers—"Lo-X" Feeder BUStribution DUCT—"Plug-in" Type BUStribution DUCT—Universal Trol-E-Duct for flexible lighting—Industrial Trol-E-Duct for portable tools, cranes, hoists.

ADEQUATE WIRING SERVES AS SAVES

BULLDOG

ELECTRIC PRODUCTS COMPANY

Detroit 32, Michigan. Field Offices In All Principal Cities. In Canada: BullDog Electric Products of Canada, Ltd., Toronto

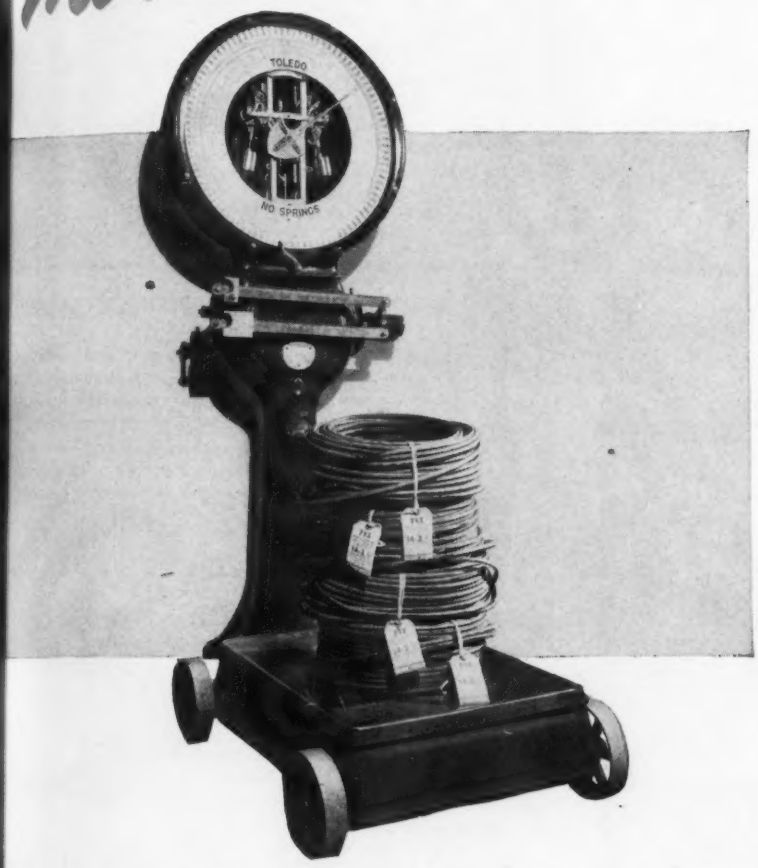
CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N. E. Sixth Avenue Tel. Garfield 2844
Portland, Oregon

Safety Switchboard Company
1445 Stevenson St. Tel. Hemlock 2470
San Francisco, Calif.

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street Tel. Jefferson 2224
Los Angeles, Calif.

LIGHT WEIGHT *makes less work*



Compare this lightweight cable with other nonmetallic sheathed cables. Notice how easy it is to handle, how quickly it can be installed. It's PVX — General Electric's thermoplastic-insulated cable for home and farm wiring — and size 14, 2 conductor (without ground wire) weighs only 74 pounds per 1000 feet. That's 11 pounds lighter than the rubber-insulated type, and means less fatigue for the men who install it.

WIRES AND CABLES

There are other fine features we'd like you to know about, too. PVX strips freely. It has excellent moisture resistance. The small diameter saves space in outlet boxes and fits smaller holes. And tough? You'll never believe how tough it is until you try it.

We'd like to tell you more about this versatile cable and its many uses. Just send a line to Section W62-1025, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

AROUND THE CIRCUIT with your

Merchandise Distributor

If you haven't used General Electric's thermoplastic building wires, you're missing one of the best bets there is for wiring that *stays in.*

G-E Types T and TW thermoplastic building wires are proof against almost everything — from oil to aging. General Electric pioneered in the development of thermoplastic building wires, and after you use them you'll know why they are still the leaders in the field.

In answer to a mounting demand for a lightweight cord, General Electric offers Type SV rubber-jacketed cord for use on vacuum cleaners, office appliances, food mixers, and for other light-duty appliances. It's Underwriters' Laboratories, Inc., approved. Ask us to show it to you. We think a lot of your customers will want to use it.

Special wiring jobs call for wires and cables made for special service. In the big family of General Electric wires and cables, you will find rip cords, shot firing cords, bus-drop cables, telephone wire, brewery cords, fixture wires, and dozens of other types for virtually any application. Let us help you pick the right wire for that next unusual installation.

Build LINE SECURITY *with* CHANCE ANCHORS

...All-Steel SCREW ANCHORS are Double-welded for Greater Strength!

Chance All-Steel Screw Anchors have a smaller hub and a thinner, faster-cutting, more accurately pitched blade than any other type of screw anchor. This advancement in screw anchor construction is possible because the spiraled blades are forged separately from the rods, or hubs as in the wrench type, and then welded together above and below the blade or helix. Thus the helix in every size is correctly pitched, tapered, and sharpened for easy installation with minimum earth disturbance. The small hub on these anchors increases holding power by allowing a greater holding surface.

The Swamp Anchor, of cast malleable iron, is as carefully designed as the steel screw anchors, and also features a sharpened cutting edge to aid in cutting through roots.

These anchors are favorites with many construction men because of the ease and speed with which they can be installed.

Easy to Install

The Chance No-Wrench Screw Anchor requires only a rod through the eye to screw the anchor down.

TRIPLEYE ROD

... Admits bar for use as "wrench"

The forged steel Tripleye on the rod will accommodate one, two, or three guy strands. It has the new full-rounded eye that protects the guy strand and prevents kinking.

WRENCH TYPE SCREW ANCHOR

This anchor permits the use of a small anchor rod, since installation strain is applied directly to the hub of the anchor instead of the eye of the rod. Constructed entirely of steel, this double-welded anchor is furnished with a Chance Thimbleye Nut, which has a full round eye to protect the guy strand and aid in slack pulling.

CHANCE SWAMP ANCHOR

Especially adapted for installation in swamps, bogs, marshes, and quicksand. Designed for guying applications in the most adverse soil conditions, it develops extremely high holding power when deeply set. The Swamp Anchor has a large Tripleye nut to accommodate one, two, or three guys.

NO-WRENCH SCREW ANCHOR

This anchor consists of a drop-forged, galvanized steel rod, double arc welded to a forged steel helix. It has been thoroughly tested to pull several times its rated holding power. These tests prove that the No-Wrench Screw Anchor is far superior in holding power to all other screw anchors tested.

How much will an anchor HOLD?

Chance engineers have developed a new formula for determining the type and kind of anchor to use for every guying condition. Your copy is ready and will be sent upon request.

C4723

A·B·CHANCE CO·

CENTRALIA, MISSOURI · SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIES

STOP VARNISH FAILURES WITH Pedigree Varnishes

Depend on Pedigree Insulating Varnishes, the Electrical Industry's favorites, to relieve you of your varnish worries. Their tried and proven superior performance through the years is your best assurance that they can do a better job for you. Give them a trial . . . convince yourself.

Your FREE copy of the Pedigree Varnish Catalog is waiting. Write for it today.

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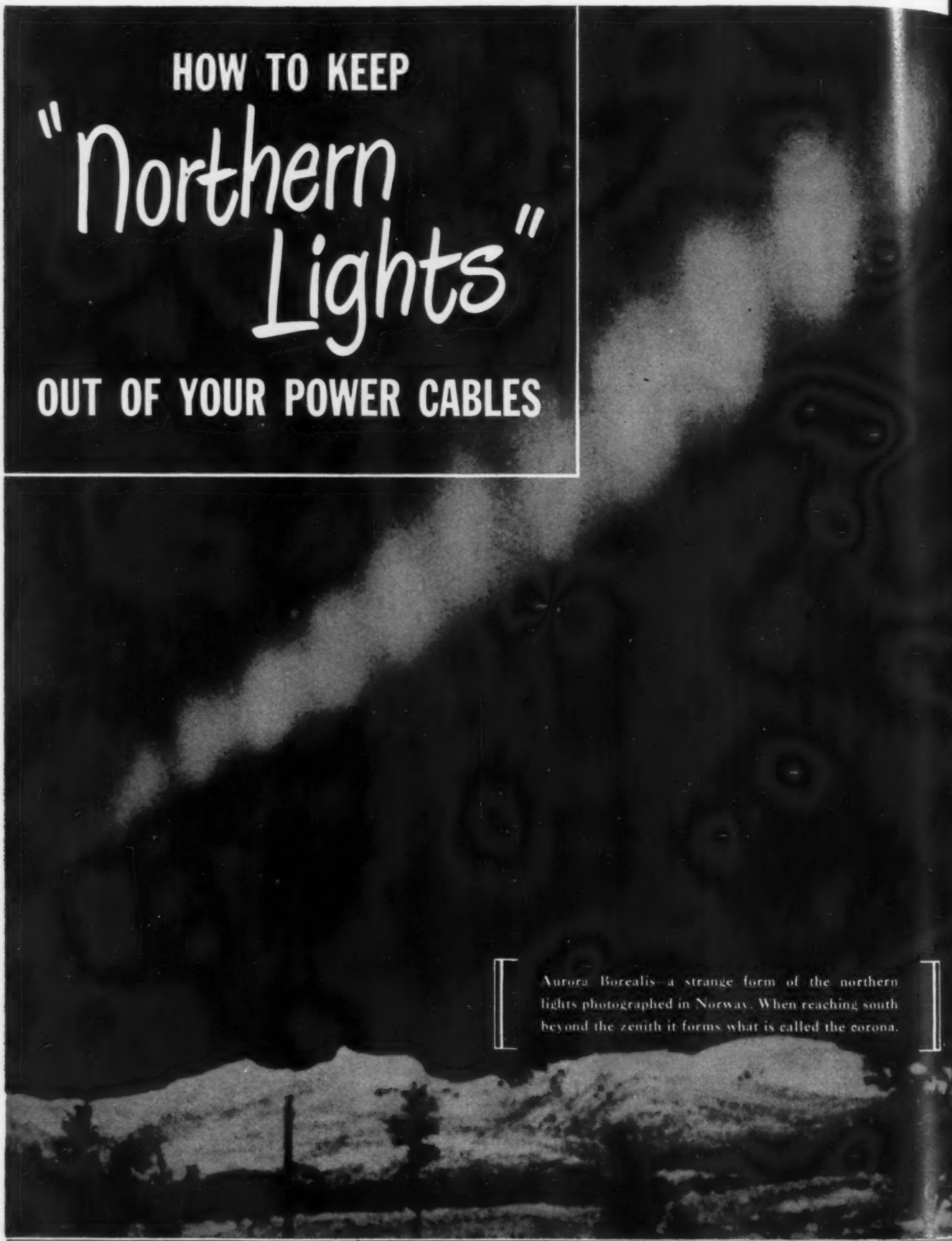
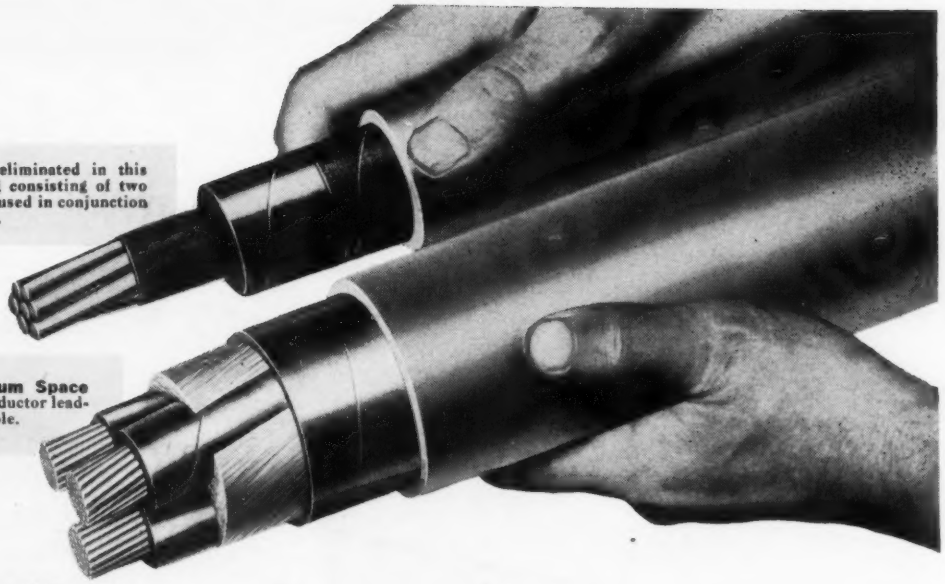
HOW TO KEEP "Northern Lights" OUT OF YOUR POWER CABLES



Aurora Borealis—a strange form of the northern lights photographed in Norway. When reaching south beyond the zenith it forms what is called the corona.

Types of Varnished Cambric Cables

- Single-conductor series street lighting cables.
- Multiple-conductor non-leaded and unarmored cables.
- Control cables with combination of different colored braids.
- Single-conductor lead-sheathed cables.
- Single-conductor non-leaded cables.
- Multiple-conductor lead-sheathed metallic-armored cables.



Corona Discharge is eliminated in this cable with PS Shielding consisting of two conducting rubber tapes used in conjunction with varnished cambric.

Maximum Power in Minimum Space is obtainable with this three conductor lead-sheathed varnished cambric cable.

PS Shielding puts a stop to Corona discharge

CORONA discharge of power cables is small in comparison to that of the Aurora Borealis or northern lights but can be extremely troublesome. Any little air gap in a power cable is a potential source of damage from corona discharges. When a metal-shielded cable is bent and later straightened, or when it expands and contracts with alternate heating and cooling in service, the metal shield tends to separate slightly from the insulation forming air gaps. The voltage of the conductor causes a spark discharge across the gap with attendant corona and ozone formation.

With type PS Shielding, this condition does not occur. The flexible conducting tape is always in intimate contact with the insulation, thus preventing formation of air gaps and eliminating corona discharges.

In cables for operation at the higher voltages, "conductor shielding"—added to the shielding over the insulation—provides a further improvement in operating characteristics. This consists of a conducting tape applied directly over the copper conductor, as pictured above.

The improved U·S·S American Varnished Cambric Cables with PS Shielding offer maximum freedom from faults . . . for they not only eliminate corona troubles but also have higher resistance to heat. They can be operated at 85° C—notably higher than rubber . . . and in the lower range of working voltages (5,000 or less), they may be safely operated at the same maximum temperatures usually recommended for paper insulation.

Write for the latest information on U·S·S American Varnished Cambric Cables.

WHERE TO USE U·S·S AMERICAN VARNISHED CAMBRIC CABLES

IN MODERATE OR LOW-VOLTAGE INSTALLATIONS where its superior heat resistance permits greater current carrying capacity for a given copper area.

• • •

IN POWER PLANTS for general wiring and such applications as insulated bus bars, motor and generator leads, connections for oil switches, transformers and voltage regulators.

• • •

IN INDUSTRIAL PLANTS, especially where heavy loads must be transmitted for short distances.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY · USS · AMERICAN ELECTRICAL WIRE AND CABLE · UNITED STATES STEEL

U·S·S American Varnished Cambric Cables

here's what "Certified" means on a Starter
. . . Samples of Certified Starters are periodically checked at individual factories by an inspector from Electrical Testing Laboratories, Inc. This helps assure uniform high quality.
CERTIFIED
E·T·L·
SPEC. NO. 6
. . . Testing a glow switch starter for endurance under unfavorable conditions . . . a rigid test for your protection, made by Electrical Testing Laboratories, Inc.
. . . Test to determine fluorescent lamp starting time at 110 to 130 volts, one of many tests made on starters to make sure they meet rigid specifications . . and assure dependable operation.

When fluorescent lighting fixtures are equipped with Certified Starters, you and your customers are protected.

Certified Starter Manufacturers build their products to exacting high standards. Electrical Testing Laboratories, Inc. test, check and recheck those products . . . CERTIFY them as fully meeting the specifications. It's a positive means of protection for your customers... and assurance of fluorescent lighting economies. Insist on the "ETL CERTIFIED" shield on the starters you sell or use!

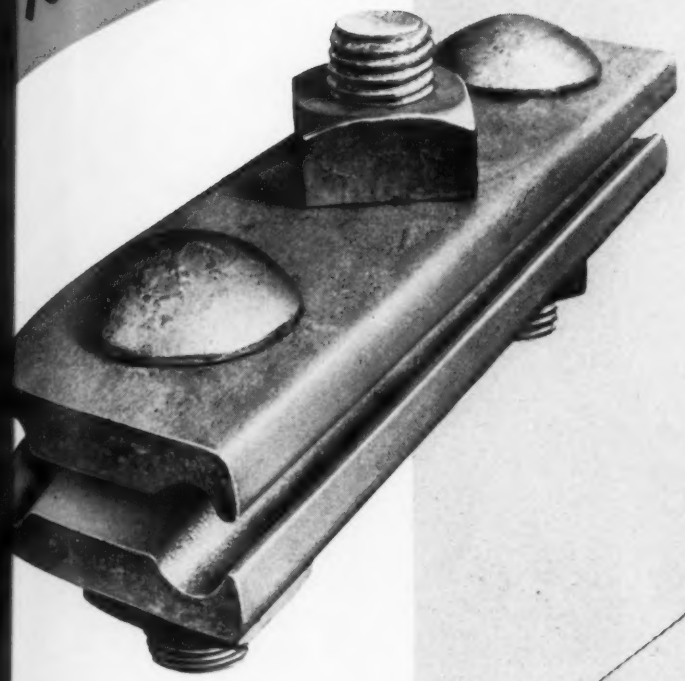
Makers of CERTIFIED FLEUR-O-LIER fixtures and RLM STANDARDS INSTITUTE fixtures have solved their starter problems by writing CERTIFIED STARTERS into their specifications.

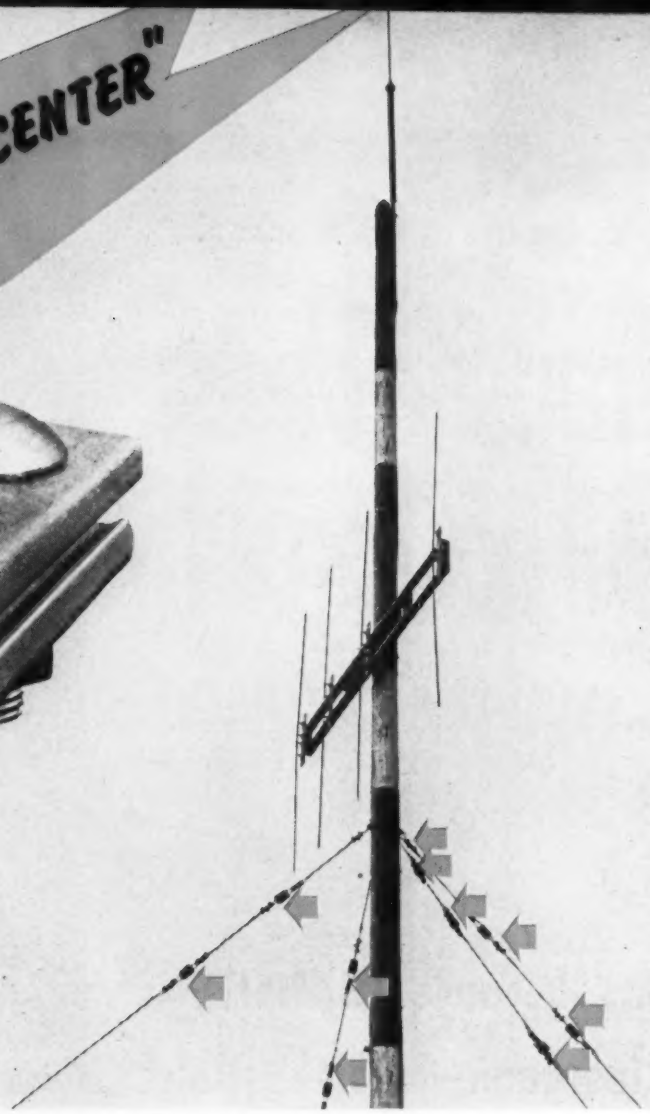
Address inquiries to any of the following manufacturers of

Certified Starters

The Arrow-Hart and Hegeman Co., Hartford, Connecticut
The Bryant Electric Co., Bridgeport, Connecticut
Dura Electric Lamp Co., Newark, N. J.
General Electric Co., Bridgeport, Connecticut
Harvey Hubbell, Inc., Bridgeport, Connecticut
Instant Glow Starter Corporation, New York, N. Y.
Kuthe Laboratories, Inc., Newark, N. J.
The Lloyd Products Co., Providence, R. I.
Pass & Seymour Co., Syracuse, N. Y.
Sheldon Electric Co., Irvington, N. J.

70 FT. UTILITY "NERVE CENTER"





FM radio dispatching tower operated by Pacific Power & Light Company, Portland, Oregon. Employs specially designed beam antenna to eliminate "skip" on Eastern stations.

HUBBARD POLE LINE HARDWARE INCLUDES:

- ★ STANDARD POLE LINE HARDWARE
- ★ CABLE MATERIAL FOR OVERHEAD AND UNDERGROUND CONSTRUCTION
- ★ COMMUNICATION SYSTEM HARDWARE
- ★ ELECTRIC RAILWAY HARDWARE
- ★ STREET LIGHTING EQUIPMENT
- ★ RURAL ELECTRIFICATION MATERIAL

—Relies on Hubbard NO-NICK Guy Clamps for Positive Rigidity and Safety

Rigid support for a 70-ft. single mast FM radio tower located on a 1081-ft. wind-swept summit is provided by Hubbard *straight-groove* Guy Clamps. Employed as a utility's "nerve center" in dispatching service and emergency crews, this intercommunicating system cannot fail even in the face of devastating storms or high velocity winds. Supporting guy wires are securely held by the maximum frictional clamping surface of Hubbard *straight-groove* Clamps without nicking, crushing or weakening the strands. Hubbard Guy Clamps (hot-dip galvanized) can be installed singly or in multiples without dismantling and reassembling. Wherever there's a need for a guy, there's need for Hubbard Guy Clamps. Order today or write for further details.

HUBBARD

Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD

IF BURNOUTS SHOULD OCCUR—

Transite Ducts will not spread Smoke or Fumes

These incombustible Transite Ducts will provide greater safety if burnouts should occur.

. . . because TRANSITE is inorganic—incombustible!

Two great hazards . . . smoke and fumes . . . are less dangerous when you specify Transite Ducts for underground cableways. Made of asbestos and cement, Transite is inorganic and incombustible. It will not support flame, or contribute gases to a possible manhole explosion if burnouts should occur.

In addition to this vital safety factor, Transite Ducts offer these four other important advantages:

1. Easy to Install—Transite Ducts come in long, light lengths that are easy and economical to assemble and install.

2. Corrosion-Resistant—Transite is inorganic—cannot be affected by corrosive soils. It is made of asbestos and cement combined under great pressure into a permanently strong structure.

3. Immune to Electrolysis—Entirely inorganic and non-metallic, Transite Ducts are not affected by electrolysis or galvanic action.

4. Permanently Smooth Bore—Long cable pulls and replacements are easy with Johns-Manville Transite Ducts. And this smooth bore minimizes damage to cables.

For further information on how Transite Ducts can *increase the safety* and *cut the costs* of Cableway systems, write to Johns-Manville, Box 290, New York 16, New York.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

TRANSITE DUCTS

CONDUIT for use without concrete

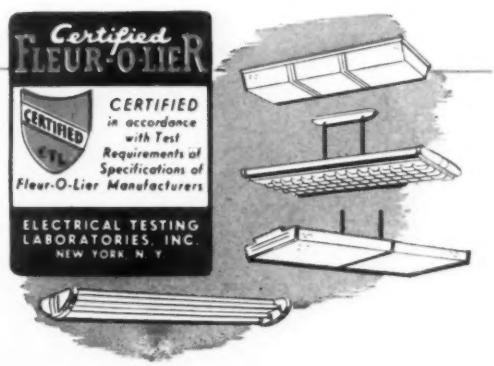
KORDUCT for concreting in

Here's how FLEUR-O-LIER fits into PLANNED LIGHTING

FLEUR-O-LIER is a "natural" for this industry-wide program for 4 very sound reasons:

1. **It means fixtures that assure good lighting performance.**
2. **It means trouble-free operation.**
3. **Many manufacturers make FLEUR-O-LIER fixtures.**
4. **Every FLEUR-O-LIER sold swells the fund to advertise and promote Better Lighting—which is another way of saying "Planned Lighting".**

To make sure that your customers get the lighting their plans call for, it pays to recommend FLEUR-O-LIER!



FLEUR·O·LIER

Manufacturers

Fleur-O-Lier is not the name of an individual manufacturer, but a group of 27 leading fixture manufacturers. Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements.

measured demand

SANGAMO

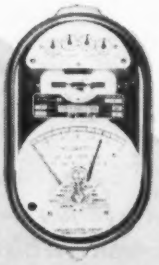
demand instruments

Longer hours of use and improved operating efficiencies have resulted in the present low price of the kilowatthour. However, unless load factors are further improved, today's high costs will not permit satisfactory operations at present low rates.

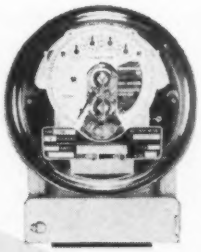
MEASURED DEMAND helps to solve this problem by encouraging your customers to improve their load factor. MEASURED DEMAND also provides the most direct basis of billing for fixed charges. An extensive line of Sangamo Demand Instruments is available to meet your specific need FOR ALL CLASSES OF SERVICE.

TYPE JS WITH JG DEMAND REGISTER

Sangamo Type JS meter with JG Demand Register for measurement of singlephase kilowatthours and kilowatt demand where a simple, compact, and economical unit is required. The Type JG Demand Register can also be supplied separately for existing meters.



TYPE JWS

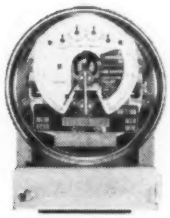


TYPE LC-2-P WITH LG DEMAND REGISTER

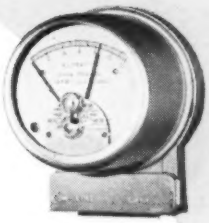
Type JWS combination watthour and Lincoln watt demand meter for measurement of demand on singlephase circuits on the thermal principle. Type LC-2-P meter with LC Demand Register for measurement of demand on polyphase circuits.

the direct basis of billing for fixed charges

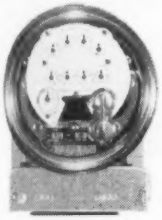
choose your demand meter from this extensive line . . .



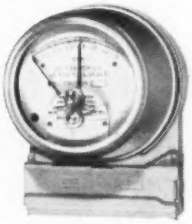
TYPE JA WITH JG DEMAND REGISTER



TYPE WDA



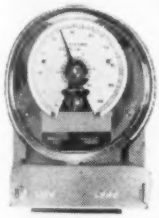
TYPE JA WITH JGC DEMAND REGISTER



TYPE VAP

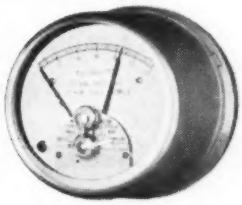
TYPE LCS WITH LG DEMAND REGISTER

TYPE JWA



TYPE AG CONTACT OPERATED

TYPE CCVA



TYPE WDS

TYPE AD

SANGAMO

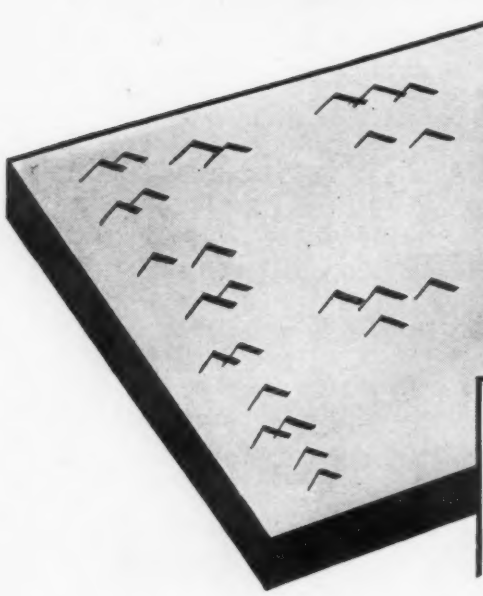
ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

SM472

UNION PACIFIC

TREASURE MAP OF INDUSTRY



Wyoming

- ☆ VAST SUPPLY OF COAL, IRON AND PETROLEUM
- ☆ LEADING LIVESTOCK STATE
- ☆ TREMENDOUS WOOL CLIP
- ☆ IMPORTANT MARKETING CENTER OF POULTRY AND DAIRY PRODUCTS
- ☆ LARGE PRODUCER OF SUGAR BEETS, POTATOES AND GRAINS
- ☆ EXCELLENT TRANSPORTATION
- ☆ OUTSTANDING SCENIC AND RECREATIONAL ATTRACTIONS
- ☆ HEALTHFUL LIVING CONDITIONS

✳ *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

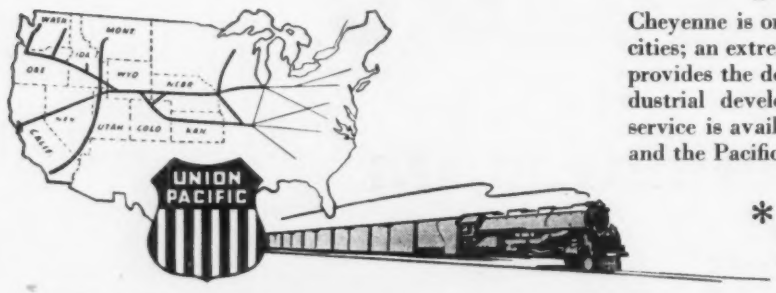
In Wyoming manufacturers will find a vast amount of raw materials. It is a leading state in potential mineral resources; produces great quantities of iron . . . has the world's largest untapped supply of coal. Copper, silver, gold, lignite and bentonite are among the mined metals and minerals. The State contains 27 oil fields and large timber lands.

Wyoming is one of the greatest of livestock States, producing fine beef cattle. Its wool clip is tremendous. Poultry raising and dairying are important activities. Principal crops are sugar beets, potatoes and grains.

The healthful climate . . . scenic and recreational attractions such as Yellowstone-Grand Teton National Park and scores of dude ranches . . . a fine educational system . . . are incentives to living in this western region.

★ ★ ★ ★

Cheyenne is one of the principal Union Pacific mainline cities; an extremely important point to the railroad which provides the dependable transportation so essential to industrial development. For travelers, daily Streamliner service is available from Cheyenne to and from Chicago and the Pacific Coast.



✳ *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

Nail down these three important facts about

Certified Ballasts:

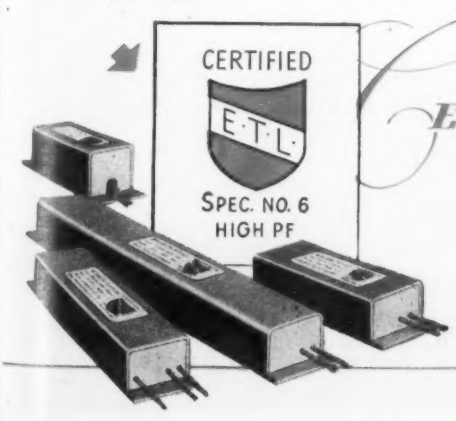
★ *They assure dependable operation of a Fluorescent lighting fixture*

★ *They are tested, checked and Certified by Electrical Testing Laboratories, Inc. as meeting rigid manufacturing specifications*

★ *Leading fluorescent lamp makers will guarantee lamp performance when Certified Ballasts are specified in a fixture*

The word "CERTIFIED" on a fluorescent lamp ballast tells you instantly that here is a product that gives you the greatest possible efficiency in operation and performance of fluorescent lighting. Insist on ballasts bearing the ETL shield in the fluorescent lighting equipment you sell. Give your customers the protection they need and want.

CERTIFIED FLEUR-O-LIER MANUFACTURERS, RLM STANDARDS INSTITUTE and CERTIFIED LAMP MAKERS have solved their ballast problems by writing CERTIFIED BALLASTS into their specifications.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting Fixtures

Acme Electric Corporation
Cuba, New York

Advance Transformer Company
1122 West Catalpa Avenue
Chicago 40, Illinois

Chicago Transformer Div.
Essex Wire Corporation
3501 Addison St., Chicago, Illinois

General Electric Co.
Specialty Transformer Division
Fort Wayne, Ind.

Jefferson Electric Co.
Bellwood, Illinois

Sola Electric Co.
2525 Clybourn Avenue
Chicago 14, Illinois

Starring and Company
Bridgeport, Conn.

Wheeler Insulated Wire Co.,
378 Washington Ave., Bridgeport, Conn.

● In guy and messenger service, Copperweld Strand provides low cost insurance because of its long life and dependable performance.

Every wire in Copperweld Strand has a core of high-strength alloy steel. Over the steel core, and molten-welded to it, is a thick, permanent covering of pure copper that will not flake or crack during bending, serving, mousing or clamping operations. Consequently, this rugged strand is non-rusting. It retains its original strength through the years—makes unnecessary the use of larger diameter strand to compensate for loss of strength caused by rusting in service.

Right now—you can join the big band of buyers using Copperweld Strand to fight the ravages of rust—to cut replacement costs—to provide greater safety—to insure permanence of outside plant at lowest annual cost.

Write us today for complete Engineering Data on Copperweld Strand.

COPPERWELD STEEL COMPANY • *Glassport, Pa.*

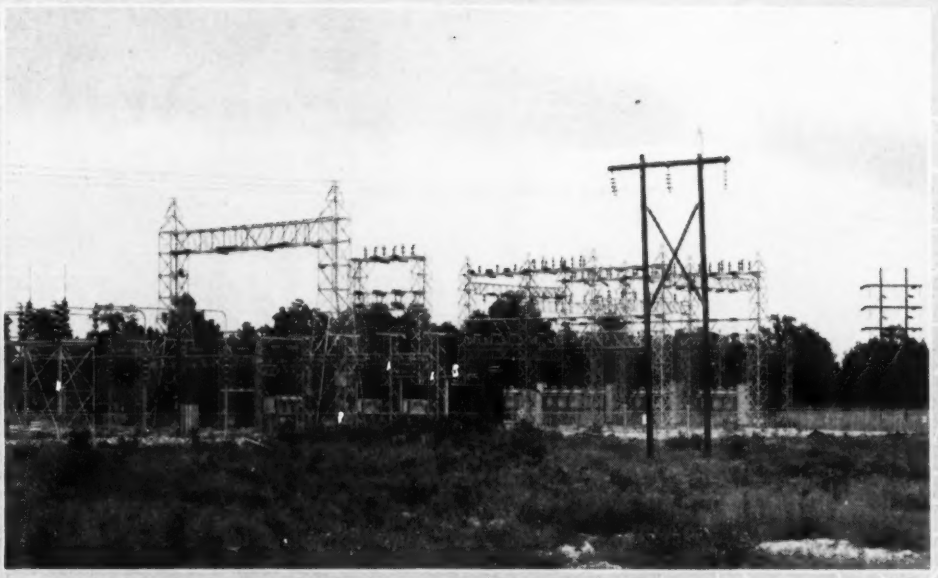
Sales Offices in Principal Cities

Pacific Coast Office: Monadnock Building, San Francisco, Calif.

Copperweld is Easily SERVED-MOUSED-CLAMPED

Copperweld

NON-RUSTING GUY AND MESSENGER STRAND FOR PERMANENT STRENGTH



BLUEPRINT *for* SOUND DESIGN

Any well-constructed substation is dependent on a **sound design** engineered to meet specific requirements. This basic design is represented by the "blue print" of engineering "know how," plus proper materials, plus a knowledge of the functional use of proper equipment, **plus the integrity and experience of a dependable manufacturer.**

In your "blue print," include the knowledge of Southern States' engineers—men with years of experience in station construction, in the manufacture of high voltage equipment—men with practical **field** experience in the power industry. These men **know** your problems—your needs—not only through manufacturing experience with Southern States, but by virtue of having lived these problems with operating companies.

Behind the knowledge and experience of these engineers stands the special facilities of Southern States Equipment Corporation—facilities complete enough to assume the largest job, yet sufficiently flexible to be devoted to the smallest design. From a one-line diagram and a plot of the available real estate or from complete specifications, Southern States stands ready to develop designs of any size and voltage **to meet your specific requirements.**

Here's your blue print for a soundly designed substation—complete in every detail and designed to do **your** job efficiently and correctly. We invite your inquiry. Address it to Box 473.

Southern States SS **Equipment Corp.**

HOME OFFICE AND FACTORY HAMPTON, GEORGIA

REPRESENTATIVES IN FOLLOWING CITIES:

BIRMINGHAM, ALABAMA
LOS ANGELES, CALIFORNIA
SAN FRANCISCO, CALIFORNIA
DENVER, COLORADO
WASHINGTON, D. C.
JACKSONVILLE, FLORIDA
MIAMI, FLORIDA
ATLANTA, GEORGIA
EVANSVILLE, INDIANA
VALPARAISO, INDIANA
LOUISVILLE, KENTUCKY
NEW ORLEANS, LOUISIANA
SHREVEPORT, LOUISIANA
BOSTON, MASSACHUSETTS
JACKSON, MICHIGAN
KANSAS CITY, MISSOURI
ST. LOUIS, MISSOURI
NEW YORK, NEW YORK
CHARLOTTE, NORTH CAROLINA
PHILADELPHIA PENNSYLVANIA
CHARLESTON, SOUTH CAROLINA
KNOXVILLE, TENNESSEE
MEMPHIS, TENNESSEE
DALLAS, TEXAS
HOUSTON, TEXAS
LUBBOCK, TEXAS
SALT LAKE CITY, UTAH
SEATTLE, WASHINGTON
MILWAUKEE, WISCONSIN

Utilities get "5-20" performance with this 3-pole, 20 cycle reclosing BZO-60 outdoor oil circuit breaker!

Protect your system with...

"5-20" BREAKER PERFORMANCE!

Allis-Chalmers Outdoor Oil Circuit Breakers Rated 115 kv and Up, Now Equipped with New 5-Cycle "Ruptor" and Pneumatic Operator!

INTERRUPTION IN 5 CYCLES . . . reclosing in 20—that's "5-20" breaker performance. It means *added stability* for your high voltage lines . . . safeguards *continuous service* for your *customers* . . . provides *best protection* for all concerned!

For breakers themselves, "5-20" performance means *greatly minimized contact wear, less oil deterioration.* It assures minimum arc energy release and low tank pressures.

If you're planning system expansion that calls for new breakers, you will want to get the *full* story on Allis-Chalmers "5-20" breaker performance.

Proved by almost 15 years of operation on breakers rated 7.5 kv and up, you can expect such benefits as:

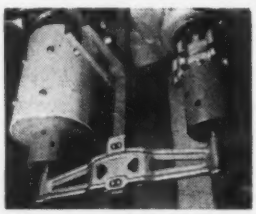
☛ Contact Simplicity—single-break contact design—with reliable, high-speed performance.

☛ High Arc Quench Efficiency—"Ruptor" device (single-break with 2 units per pole) snuffs out heavy short circuit arc within 0.055 of a second from parting of contacts.

☛ Quick Contact Inspection—easy removal of "Ruptor" shell unit exposes contacts. Operation may be checked by manual closing of breaker.

For complete information on 5-cycle "Ruptor" equipped (115 to 230 kv . . . 1,500,000 to 3,500,000 kva) or other breakers to meet your requirements, call your nearby A-C Sales Office, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS.

PRINCIPLE OF "5-20" BREAKER PERFORMANCE EXPLAINED



NEW 5 CYCLE dynamic (single break) "Ruptor" includes 2 devices per pole. "Ruptor" limits arc energy release . . . helps to maintain dielectric strength of oil in tank. Electrostatic shield, left, increases insulation factor between contacts and tank.

1—Like arrows from a bow, contacts open lightning-fast upon release of stored energy in powerful accelerating springs!

2—Like a tornado, pressure created by arc swirls oil through helical throat, developing great oil turbulence in "Ruptor" . . . quenching arc and clearing arc path . . . interrupting circuit in 5 cycles or less from energization of trip coil.

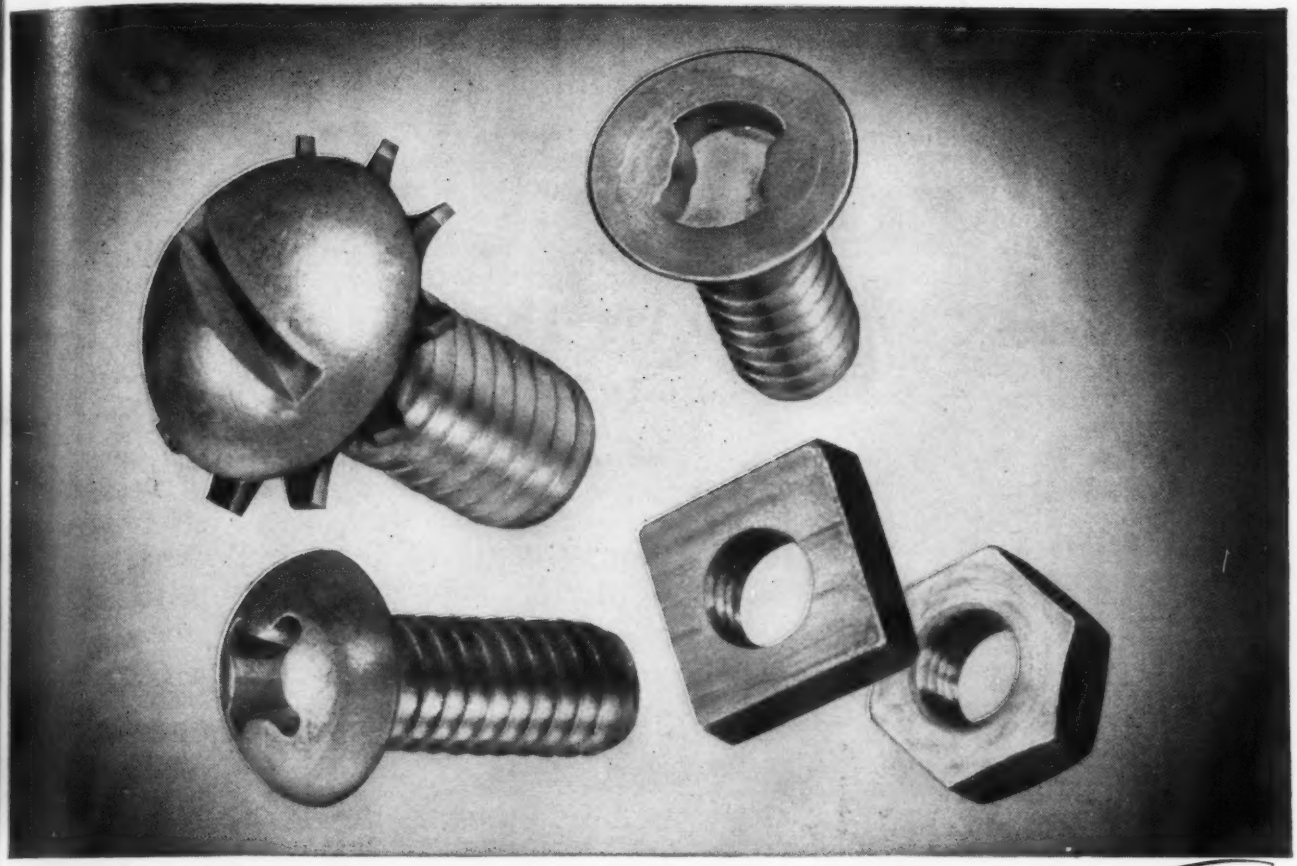
3—Ultra-rapid pneumatic operator recloses breaker within 20 cycles.

A 2184

ALLIS-CHALMERS

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products



WHEN YOU CAN COUNT ON EVERY FASTENER... THAT'S t.f.e. True Fastener Economy!

It's the cost of using a fastener that counts

The saving you can make by being able to depend upon your supplier's "quality control" and by reducing inspection in your own plant, invariably amounts to a greater saving than could be effected if a lower price were available.

R B & W *Machine Screws and Stove Bolts Made to One Quality Standard*

At each RB&W plant, quality control is effective at every stage of manufacture—beginning with laboratory analysis of raw materials—*not* just at the end of the production line. The finished product that is delivered to you can be depended upon for uniformly high qualities—giving you a fastening device that assembles at high speed, provides maximum desired holding power and, in terms of finish, is a credit to the appearance of your assembled product.

You Get T. F. E. *When You*

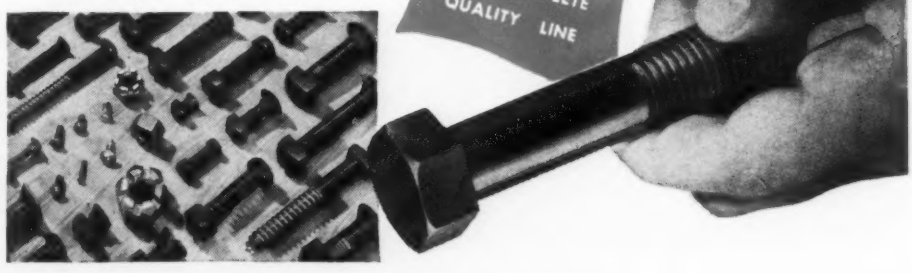
1. Reduce assembly time to a minimum by savings through use of accurate and uniform fasteners
2. Make your men happier by giving them fasteners that make their work easier
3. Reduce need for thorough plant inspection, due to confidence in supplier's quality control
4. Reduce the number and size of fasteners by proper design
5. Purchase maximum holding power per dollar of initial cost, by specifying correct type and size of fasteners
6. Simplify inventories by standardizing on fewer types and sizes of fasteners
7. Save purchasing time by buying larger quantities from one supplier's complete line
8. Contribute to sales value of final product by using fasteners with a reputation for dependability and finish

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

102 years making strong the things that make America strong

RB&W bolts, nuts, screws, rivets and allied fastening products are manufactured in a broad range of styles, sizes and finishes.

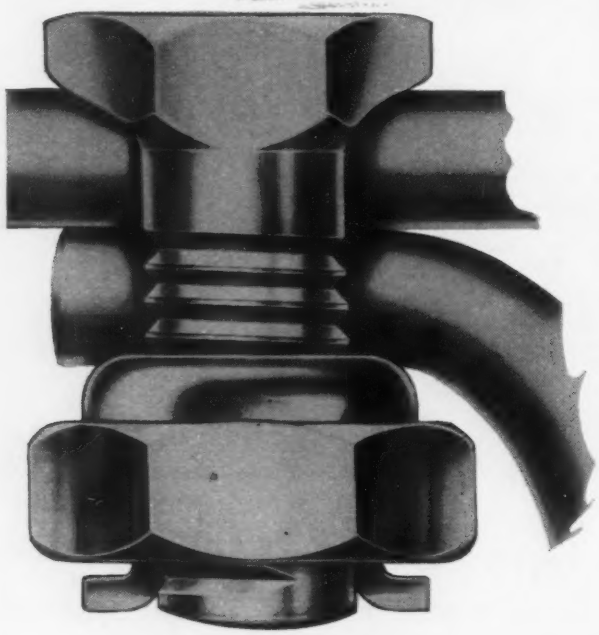
Plant at Los Angeles, Calif.; other plants at Port Chester, N. Y.; Corapolis, Pa., Rock Falls, Ill. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Portland, Seattle. Distributors from coast to coast. By ordering through your distributor, you can get prompt service from his stocks for your normal needs. Also—the industry's most complete, easiest-to-use catalog.



Use Tough

Kearnalloy BRONZE CON-NEC-TITES

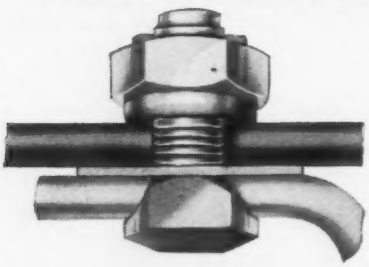
For Line Connections That Stay Tight—Without Nicking Line Wires



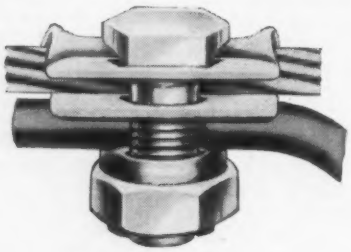
Con-Nec-Tites of the new Kearnalloy bronze are tough and mechanically strong enough to withstand high torque. Yet they are resilient enough to cushion against line wires and prevent nicking.

All Kearney Con-Nec-Tites have clean, uniform threads, thread lead pilots, V-groove surfaces in head and washer and correct slot width. Use tough, nick-free Kearnalloy Con-Nec-Tites for all types of connections.

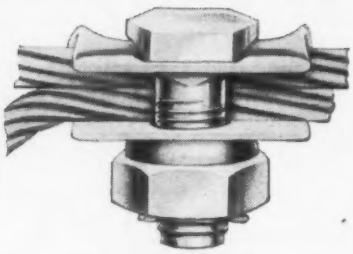
Eliminate Electrolytic Action—Use Plated Con-Nec-Tites



Copper to Aluminum



Aluminum to Copper



Aluminum to Aluminum

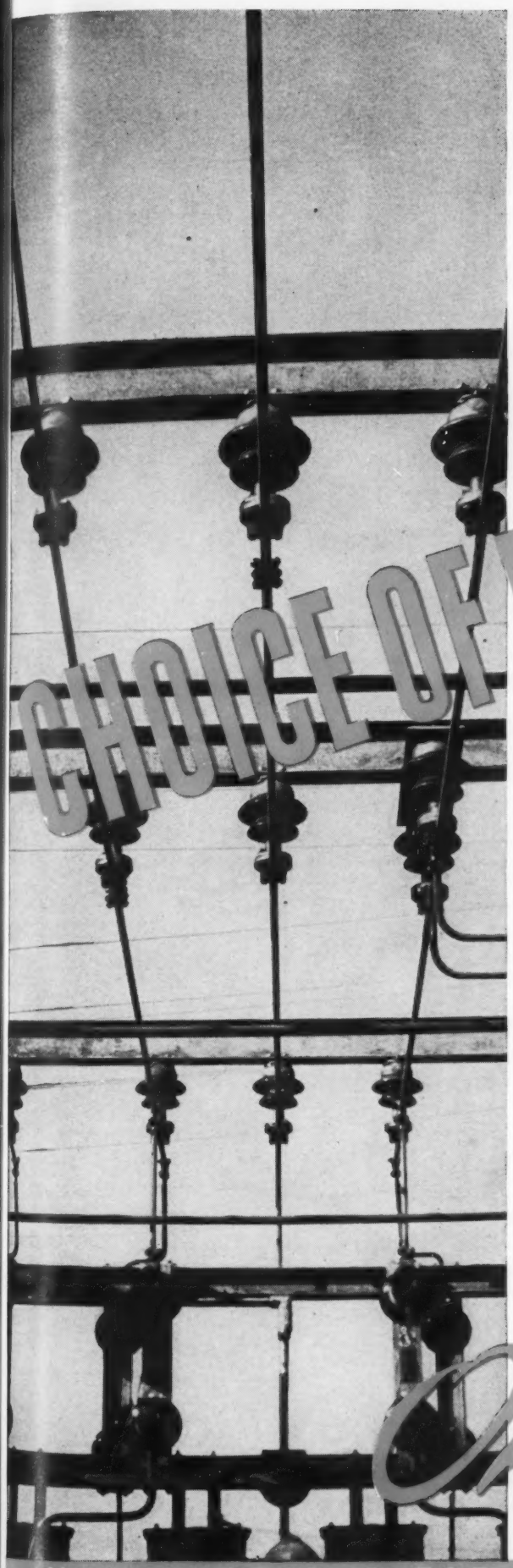
The cadmium plated Kearnalloy Con-Nec-Tites shown here prevent electrolytic action because the copper and aluminum wires never come in contact with one another. Use them to assure good conductivity and tight connections.

95

For Better Results

Specify **Kearney Products**

MAYDWELL & HARTZELL
INCORPORATED
LOS ANGELES • SAN FRANCISCO • PORTLAND • SEATTLE



THERMAL RESISTANCE IS ONE MORE REASON

FOR MAKING O-B YOUR CHOICE OF INSULATORS

TEMPERATURE CHANGE is the enemy of insulator life. Porcelain and metal react differently--expansion-wise--to heat and cold. Porcelain is the more fragile and must be protected. This problem is magnified in switch and bus insulators by their relatively massive metal components. Protection of the porcelain requires nice design... New insulators look alike, test alike, *are* very much alike when on the shelf. Their new condition is no sound criterion of their performance for the next ten years or more. ... But, when insulators just like them have passed that first ten years, and another ten, and still another, you then have some measure of the soundness of design that made this possible... All we can say by way of tangible proof of O-B durability is this--look at the old ones with 20 or 30 years on their heads. Check their performance. Then O-B will be *your* CHOICE OF INSULATORS!

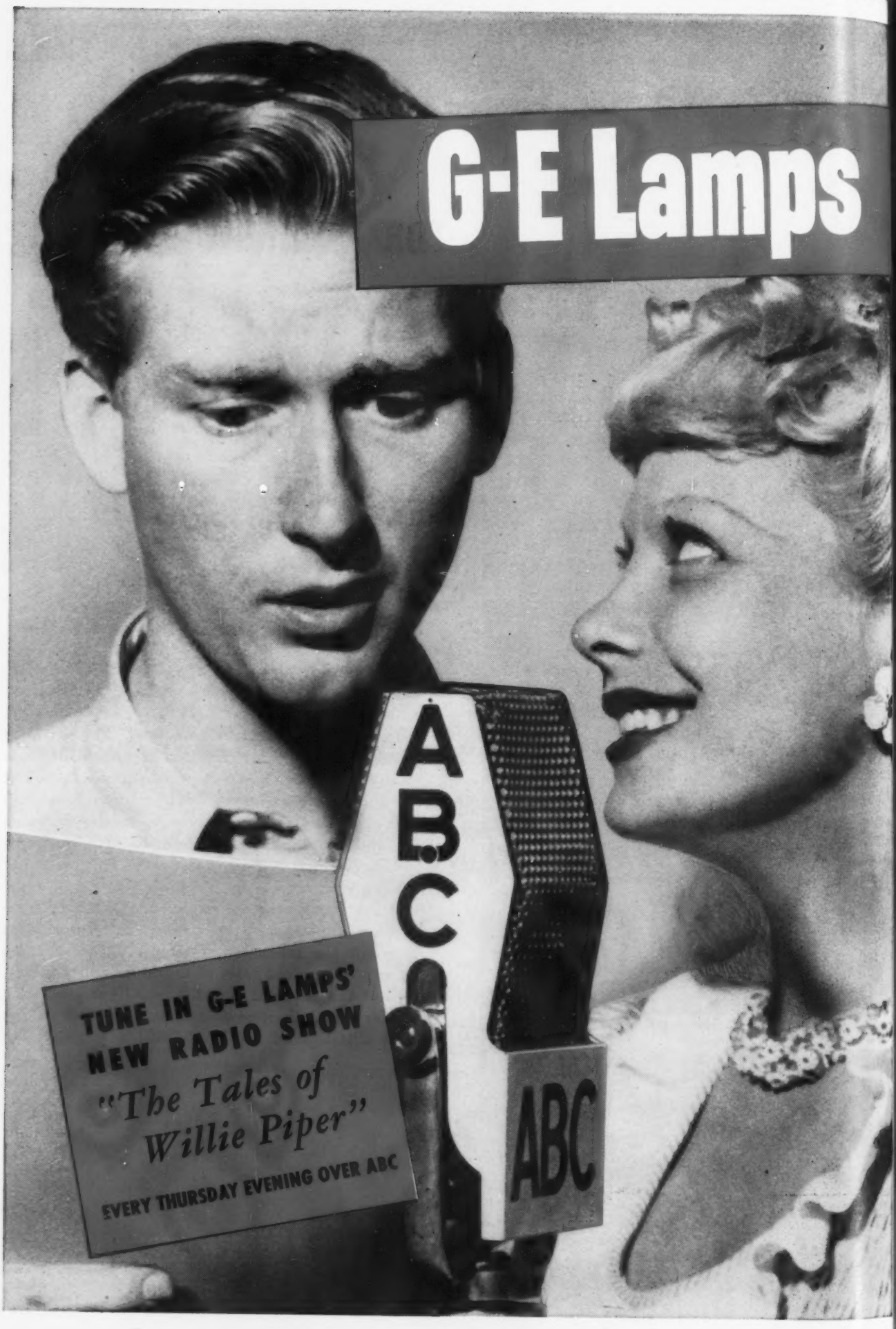
2776 H

Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONTARIO

HEADQUARTERS FOR PORCELAIN INSULATION


G-E Lamps
ABC
ABC
TUNE IN G-E LAMPS' NEW RADIO SHOW
"The Tales of Willie Piper"
EVERY THURSDAY EVENING OVER ABC

are back on the air!

...another powerful promotion that will help to fill empty sockets

REACHES HUGE AUDIENCE OVER 166 ABC STATIONS

Heard the latest in radio? General Electric now sponsors "The Tales of Willie Piper" every Thursday at 9 P.M., EST, over a coast-to-coast American Broadcasting Co. network of 166 stations—bringing G-E Lamp advertising messages to millions of families. It's the newest voice of the best-known name in lamps.

THIS FRIENDLY COMEDY MAKES PEOPLE "LIGHT CONSCIOUS"

"The Tales of Willie Piper" is a happy half-hour drama that's heart warming, human and filled with chuckles. Each Thursday evening show tells the story of typically American events in the lives of young Willie Piper, his wife Martha, his meddlesome father-in-law Mr. Gillespie, and other small town folk who make up the cast. It combines good family entertainment with plenty of reminders to fill empty sockets with right-size G-E lamps!

HOW G-E LAMP RADIO ADVERTISING HELPS TO BUILD YOUR PROFIT LOAD

Many of the commercials on the new G-E Lamp radio show use hilarious bulbsnatching incidents to dramatize the importance of keeping spare G-E lamp bulbs on hand to replace burnouts.

And others are used to stimulate popular interest in the wider use of General Electric lamps for all purposes —lamps for lighting, sunlamps, heat lamps, germicidal lamps. So every week "The Tales of Willie Piper" makes more friends for G-E Lamps—more friends for the electrical industry.

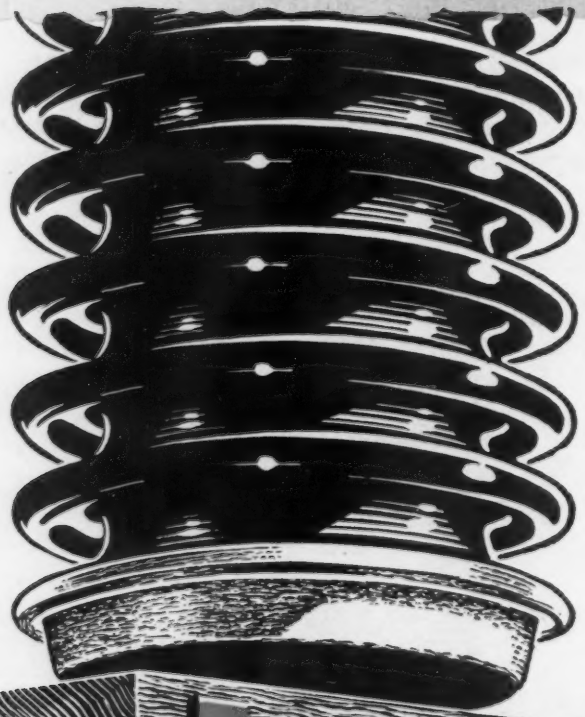
G-E LAMPS

GENERAL ELECTRIC

BEST PERFORMANCE UNDER MECHANICAL ATTACK . . .

. . . best insulator for ALL operating conditions . . .

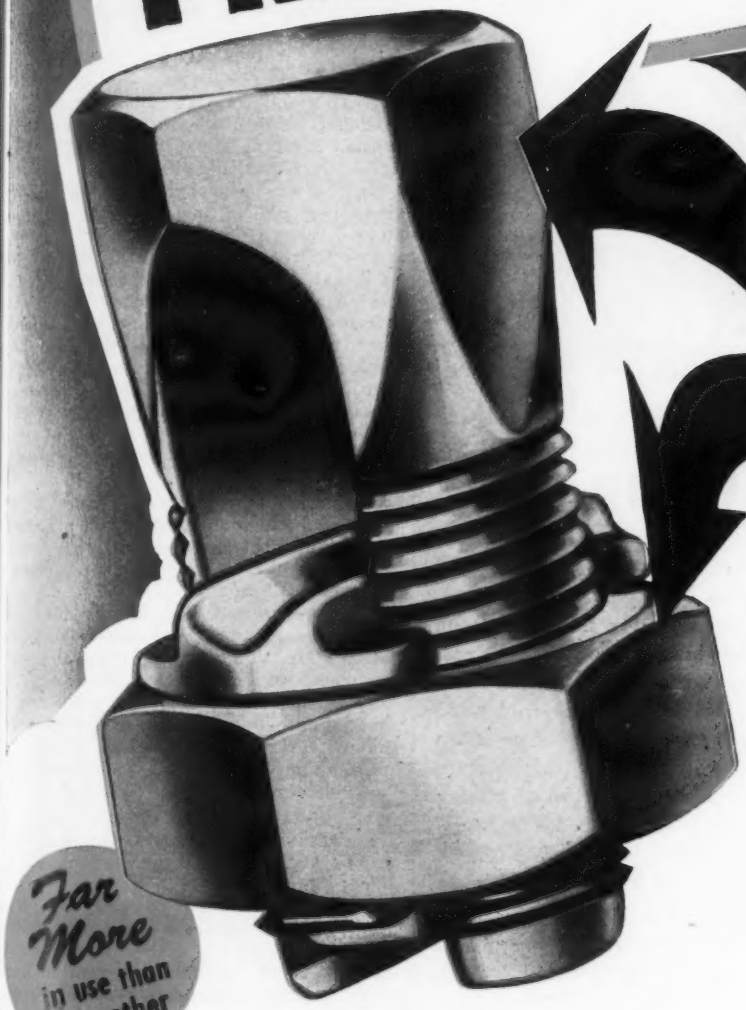
LAPP LINE POST



● For 16 years Lapp Line Posts have been going up on the transmission lines of America—a large percentage of them in "trouble spots" where no other type of high-voltage insulator would stand up. Along back roads, and in woods, for example, where insulators are number-one choice as targets for stones and bullets. Under such service conditions, Lapp Line Posts out-perform conventional insulators, in some cases by as much as 100-to-one. Performance under arcover, and in contaminated atmosphere, add to this, to prove that *lines on Lapp Line Posts have fewer insulator outages, require fewer replacements and less maintenance than comparable lines on any other type of insulator.* Isn't that good enough reason for you to decide that Lapp Line Posts are the best choice for transmission line use on your system?

Lapp INSULATOR CO. INC. LEROY, NEW YORK

Here's the MOST PRACTICAL design



LARGER SURFACES

to grip with wrenches from ANY ANGLE—using either a socket or open-end wrench.

MAXIMUM CONTACT provided by V-groove; conductors protected by bevelled slot.

PRECISION MADE, with rigid inspection. Smooth, accurate threads assure maximum pressure — permanently maintained.

For taps, dead-ends, parallel connections, etc., in any location. Can be furnished in bronze or aluminum. Reusable over and over.

Far More in use than any other

PENN-UNION ELECTRIC CORPORATION, ERIE, PA.

Kenneth Anderson Co.
412 Seaton St.
Los Angeles

Northwestern Agencies
4130 First Ave. South
Seattle, Washington

F. M. Nicholas Co.
1123 Harrison St.
San Francisco

With or without retainer.

The COMPLETE Line of Conductor Fittings

PENN-UNION

something new in tool belts

"KLEIN-LINE" TOOL BELT with the sliding trace

The "Klein Line" Tool Belt—new in design—provides increased comfort and convenience and a maximum factor of safety to the lineman.

The distinctive feature of this new belt is the Sliding Trace. Made of "Klein-Kord" (the same proved material used in our safety straps), the Sliding Trace is mounted on the cushion and carries the drop-forged tested single bar Dee rings. The trace slides freely through alloy steel guides, allowing movement of approximately 6 inches in either direction. Thus, the lineman is relieved of chafing often caused by conventional belts, and undue safety strap wear is prevented.

Other construction features of the new "Klein-Line" Belt include: 2-inch wide heavy harness leather belt strap with drop-forged buckle; 1-inch wide harness leather tool loop strap securely riveted to the main strap; and 4½-inch wide cushion of pliable latigo leather with rolled edges and canvas interlining. All sewing is lock stitched with hot waxed linen thread—all rivets solid copper hand set. Furnished complete with plier pocket, tape thong and knife snap.

Ask Your Supplier

Foreign Distributor: International Standard Electric Corp., New York

A copy of the Klein Pocket Tool Guide, showing the Klein line and containing valuable tool information, will be sent on request.

Mathias KLEIN & Sons

Established 1857 **Chicago, Ill., U.S.A.**

3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

ELECTRICAL BOOKS

MEN AND VOLTS AT WAR, by John A. Miller, 272 pages 6x9 Whittlesey House, $3.75.

Story of General Electric's accomplishments in World War II copiously illustrated with on-the-job stories and photographs of the wide variety of equipment furnished in great quantity by this largest electrical manufacturing company. Book points up industrial accomplishment both in all-out production of standard equipment, and in development and production of the special implements of this highly mechanized war. Included is a chapter giving a succinct summary of the birth, development, and problems of the Manhattan Project which says a great deal in relatively few words.

NATIONAL ELECTRICAL CODE HANDBOOK, by Arthur L. Abbott, 6th edition, based on 1947 edition of the Code, 633 pp., 5x7½, illustrated, McGraw-Hill, $4.

In the six years since the 1940 Code so many new devices, materials and conditions have developed that the 1947 Code is almost a new instrument and more than ever before is this standard guide to understanding and complying with the rules necessary to electricians, contractors, inspectors and engineering designers of wiring systems. The illustrations aid in visualizing what some of the wording means. Some of the rules are reworded to make their meaning clear, or additional explanation is given to aid in understanding the purpose or principle involved.

USE AND CARE OF POLE CLIMBING EQUIPMENT, A Field Manual, 27 pp. 6 x 9, paper cover, illustrated, prepared and published by the Accident Prevention Committee, Edison Electric Institute, 25c.

Photographs and text describe the purpose, use, adjustment and care of body belt, safety strap, climbers, leg strap and other equipment used by electric linemen. It includes field tested methods of climbing and descending poles with least risk, correct procedures for routine tasks, and a suggested rescue hitch for lowering an injured lineman to the ground.

ELECTRONICS FOR INDUSTRY, by W. I. Bendz and C. A. Scarlott, 501 pp., 6x9, illustrated, John Wiley & Sons, $5.

This is a book for 60-cycle men. It is aimed at those engineers who, having neither the necessity nor the desire to become electronics experts, nevertheless want to know about fundamentals, tubes, types of circuits, and where these are applied. It is built around experience in classes presented to practicing engineers already familiar with the fundamentals of electric circuits and for whom the details and mathematics of electronic engineering were not of interest. Both the authors are with Westinghouse.

LEARNING TO WELD, 5½x8½, 32 pp., paper-bound, published by The Lincoln Electric Co., 25c.

You don't need a college education to understand this book, but it's very much to the point as to simple, practical welding technique, with clear drawings and photos. It's a good starter. Those with some welding experience will want more advanced books, of which Lincoln has published seven.

UNITED STATES RUBBER COMPANY

SERVING THROUGH SCIENCE

They said it couldn't be done!

Quite a few people didn't believe a natural rubber-covered building wire could have the smallest diameter in the business and *at the same time* have no equal in physical and electrical properties.

But that was before U. S. Rubber Company scientists produced Laytex (Type RU). Today, Laytex is the wire man's delight. Its small diameter permits more circuits per conduit. By means of a special dip process, Laytex is insulated with 90% unmilled grainless natural rubber. The conductors are perfectly centered in this insulation, thereby avoiding any chance of thin spots.

Laytex (Type RU) is lighter in weight, easier to install. The saturated cotton fibrous cover is flame-retardant and moisture-resistant.

UNITED STATES RUBBER COMPANY
1230 Avenue of the Americas · Rockefeller Center · New York 20, N. Y.

Specify RU **Laytex*** **ELECTRICAL WIRES AND CABLES**

SAFETY FACTORS THAT PUT *RU* OUT IN FRONT

BULL'S EYE
The conductor is on dead center throughout every inch of the wire.

ELEPHANT INSULATION
Laminated walls of tough natural rubber insulation mean Laytex is safe.

SMALLER O.D.
Allows more circuits per conduit than in ordinary wire. Lighter weight.

*Reg. U. S. Pat. Off.

Now under

Certification

CERTIFIED ETL

1
INDUSTRIAL LIGHTING EQUIPMENT

2
COMMERCIAL LIGHTING EQUIPMENT

3
PORTABLE LAMPS

4
HOME LIGHTING FIXTURES*

5
COMPONENT LIGHTING EQUIPMENT

6
BALLASTS

7
STARTERS

8
PORTABLE LAMP GLASSWARE

9
PORTABLE LAMP SHADES

•

Those products which pass specifications are labeled.

List of certified products under any of the classifications above is available. Write:

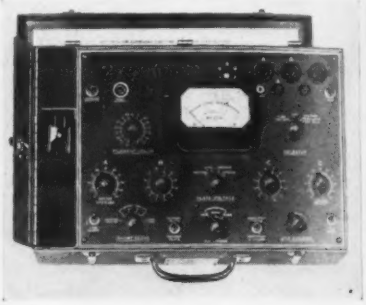
ELECTRICAL TESTING LABORATORIES, INC.
2 East End Avenue at 79th St., New York 21, N. Y.

**In preparation.*

PRODUCT NEWS

Tube Checker (1000)

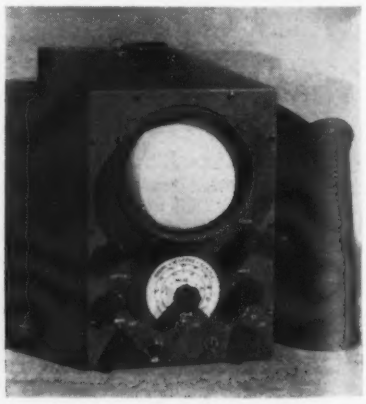
Weston Electrical Instrument Co. has announced a new proportional mutual conductance tube checker, Model 798 Type 5. This instrument tests all receiving tubes and handles voltage regulator tubes and low power thyratrons. Using a new method of testing, the differential frequency system, the tube checker is said to provide proportional mutual conductance readings under



conditions which closely resemble actual operation. "Good-bad" readings also are provided. Sixty-cycle a-c potentials are used on tube elements; a separate internal 5-kc signal is applied to the control grid and the resulting plate component of the high-frequency signal is measured on a rectifier meter. The 798 operates on 105/125 volts, 50/60 cycles. A rapid reference chart, listing test values of all commonly used tubes, is mounted within the lid.

Fault Finder (1001)

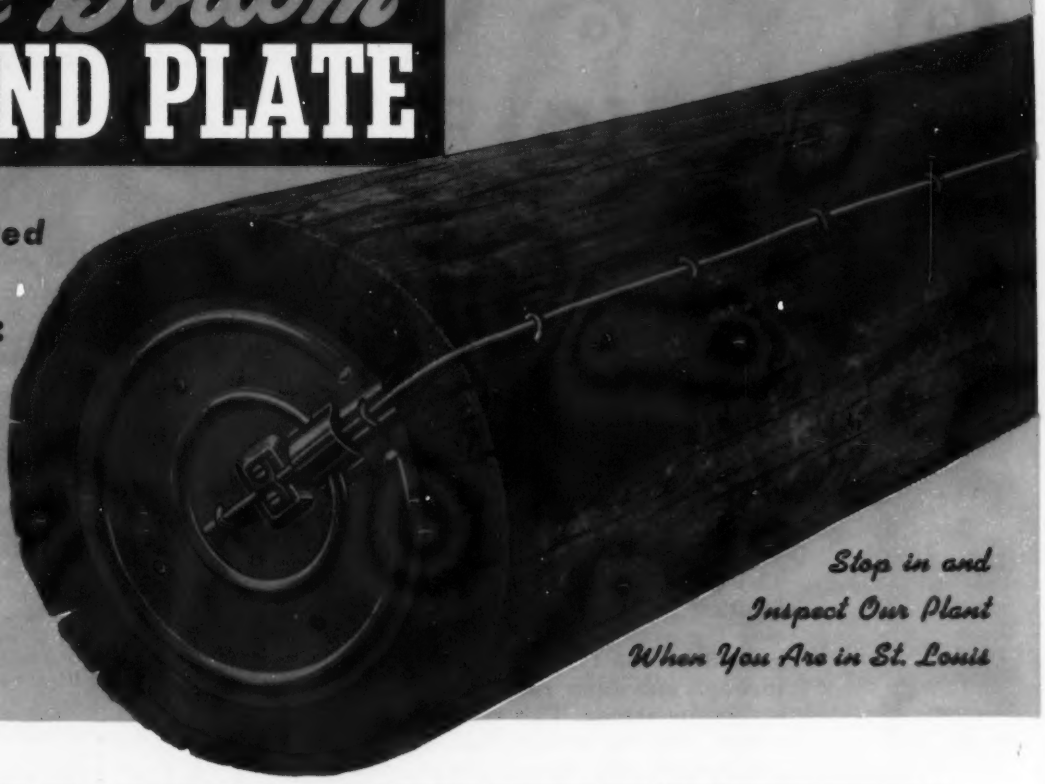
Radar Engineers have announced the Fault-Finder, a device which applys the radar principle of reflected pulses to transmission line maintenance. As described by the manufacturer, in operation a picture of the line under test appears on the screen of a cathode ray tube, and any open or short cir-



cuit, sudden change in line spacing, etc., is indicated in its position along the line. Distances are read from a marker dial which is calibrated directly in miles. Normal range of instrument is 100 miles and provision is made for the operator to expand any selected short section of the line for detailed inspection.

New! Improved!..

BLACKBURN *Pole Bottom* GROUND PLATE



REA Approved

How to Order:

See your Jobber and specify BLACKBURN Pole Bottom Ground Plate.

Catalog Number GP-100
(Made in 1 size only)

Shipping Weight:
40 lbs. per 100

Patented

Stop in and Inspect Our Plant When You Are in St. Louis

3 BIG QUALITY FEATURES!

1. Supplied with double bar connector (one bar on each side of plate). These double bars grip wire tightly and positively—ground wire will not pull off or loosen as pole is set in hole.

2. It's stronger—more rigid—easier to handle—easier to store—easier to install—send for sample and see for yourself!

3. Connector screws are made of high strength Duronze—will not season crack—can be installed tightly without stripping or distorting.

You get all these features and others too—at no additional cost—so specify BLACKBURN Pole Bottom GROUND PLATES!

SEND FOR A SAMPLE AND SEE FOR YOURSELF!

FIRST, MADISON & CLINTON STS. • **JASPER BLACKBURN PRODUCTS CORP.** • ST. LOUIS 6, MISSOURI

BUILDERS OF QUALITY PRODUCTS FOR 15 YEARS!

CRESCENT

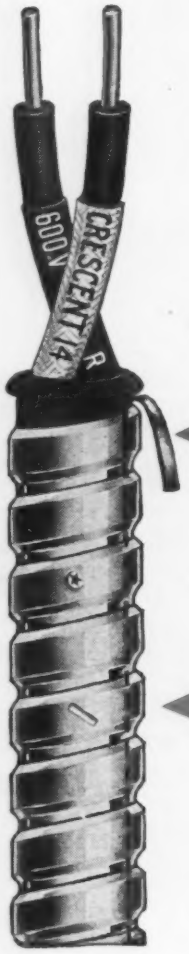
ABC Armored Cable

Has These Improved Features Which Result in

INCREASED SAFETY

and

LOWER COST



Bond Strip Under Armor

Permanently low armor resistance **is provided in sizes No. 14 and 12 AWG by use of a flattened bonding wire which is in contact with the under side of each convolution. These sizes now are smaller and lighter, since they use the smaller diameter Type R conductors of the 1947 National Electrical Code.**

Prefabricated Break Lines

The Cut Mark (at 1½" intervals) shows the location of a prefabricated breaking line inside the armor. Only a few strokes of a file guided by the Cut Mark are required to cut through one outer ridge, and a bend by hand severs the armor. This results in a clean separation with no sharp edge — a safer, easier and faster job. The prefabricated breaking lines are so designed that there is *no reduction* in tensile strength, bending quality, crushing resistance and electrical conductivity of armor.

The Armored Cable Industry is celebrating its 50th Anniversary. In the last 20 years alone over SIX BILLION FEET of Armored Cable have been installed.

CRESCENT
WIRE and CABLE

CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

Thermistor Bridges

Two new thermistor bridges providing r power measurement up to two milliwatts frequencies up to the shorter microwave r gions are available from Sylvania Electr Products.

Type TBN-7SE is for continuous duty n o r m a l laboratory ambient temperatur where measurement in S, X and K micr wave bands may be made accurately wi suitable r-f measur'ng heads. The bridge independent of frequency but should be u with appropriate thermistor mount. Tw milliwatt scale sensitivity is essentially line but a calibration curve is required for ea r-f head used. The instrument, designed f 100-130 volt, 60 cycle a-c input, is rated 25 watts; weighs 14 lb.; measures 8x8½x in. Tube complement includes one 6X5GT/ two VR-105 and one VR-150.

Type TBN-6SE thermistor bridge, whi requires external oven and thermistor mou contains a Wheatstone Bridge circuit wi three precision resistor arms and externa mounted thermistor; a stabilized 2000-cy source for the bridge; stable d-c source f substitution measurement of r-f power; amplifier. It is independent of frequency a can be used as a balanced or unbalanc bridge providing accurate full-scale me readings from 25 microwatts to 2 milliwat Designed for 115 volt, 60 cycle a-c input, is rated at 150 watts exclusive of exter oven. It weighs 54 lb. exclusive of oven a thermistor mount and measures 10¼ high, 21 in. wide and 15 in. deep. Tu complement includes seven 12J5, three 6Y6 two 5U4G, three 12SH7 and two VR-90.

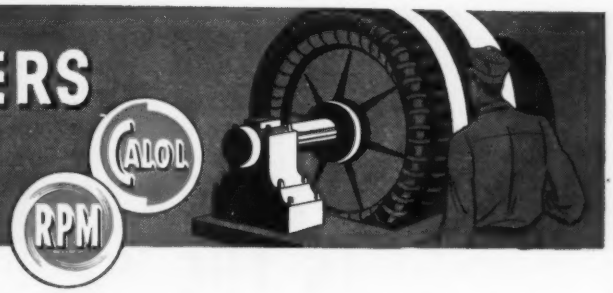
Farm Motor Starter

Designed for farm application, the We inghouse magnetic Farmstarter for sing phase motors is intended for across-the-l motor starting service. Two models are av able, with either built-in push-button or lector switch control station. The former p vides protection against unexpected resta ing following a power outage, the latter au matic control by means of time clock, pr sure switch, etc., and automatic restart after power outage. Three sizes are av able—3, 5 and 7½ hp. for 230-volt servi The 3- and 5-hp. sizes have dual-voltage co and will handle a 1½- and 3-hp. motor spectively when connected for 115 volts.

Switchboards

Saflex Servicenter switchboards have be announced by Square D to include three ferent size switches in four potential ratin in one uniform-size cabinet. Two or more these cabinets can be bolted together to m switching and control requirements of s cific jobs. All enclosures are dead-fro dead-rear, with equipment accessible fr the front. Cabinets are finished in grey H mertone. Underwriters' approved.

STANDARD ENGINEERS NOTEBOOK



Wax floor spray destroys dust bacteria

Many plant operators have reduced wear on floors and eliminated the possibility of the spread of disease from floor dust, by the regular use of Standard Wax Floor Spray instead of floor oil.

This special maintenance product has the dust-controlling qualities of floor oil and the sealing properties of wax. It also has germicidal properties and is odorless.

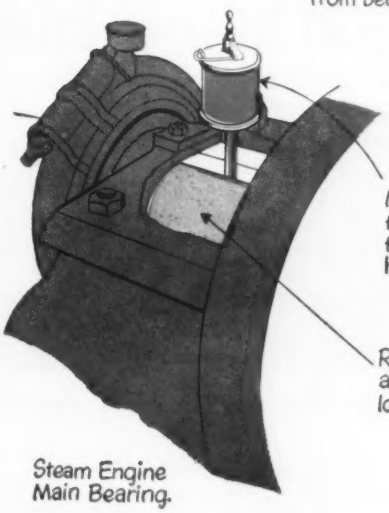
It contains a large percentage of completely dissolved wax which is carried deep into floor surfaces by its oil component. It is recommended for all wood floors, linoleum, terrazo, tile and composition materials. It should not be used on rubber or asphaltic surfaces.

Standard Wax Floor Spray may be applied by brush, mop or spray as conditions require. A light spraying on a floor before sweeping instead of the use of sweeping compound has often proved economical and very satisfactory.

Standard Wax Floor Spray is an odorless, light-bodied floor maintenance product.

May be applied by spray, brush, or mop.
Penetrates and preserves hardwood, soft wood, linoleum, terrazo, tile, and composition floors.
Contains wax, oil and germicide.
Minimum flash point of 250° F.

Calol Red Engine Oil X is compounded to resist high pressure and displacement from bearing surfaces.


High affinity for metal cuts consumption and helps prevent rusting.
May be applied by drop-feed, ring, chain, wick-feed oilers or by hand oiling.
Reduces starting torque and friction in high-load, low-speed conditions.
Steam Engine Main Bearing.

New compounded Red Engine Oil cuts expense

To meet severe conditions encountered in the lubrication of external bearings of general industrial machinery, Calol Red Engine Oil X was recently developed and added to the Calol Red Engine Oil line. This new oil comes in three viscosity grades: 13X, 16X, and 26X.

Calol Red Engine Oil X is made from selected mineral oils to which are added special compounds. The high quality base oils and special additives give it outstanding ability to maintain a tough oil film on bearings in heavy-load high-temperature conditions. Compared to straight mineral oils, this cuts consumption, lowers starting torque and frictional resistance, gives more protection against rusting and promotes better circulation in ring-, and chain-oilers.

Calol Red Engine Oil X has a low pour test which allows easy application in a wide range of atmospheric temperatures.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your local Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

Announcing

A NEW ORGANIZATION IN THE WEST

to Manufacture

ENGINEERED *Slimline* LUMINAIRES

CLYDE E. ALLEN

ROBERT E. OLSEN

"Functional Competitors of Daylight"

Clyde E. Allen and Robert E. Olsen announce the formation of Allen & Olsen Manufacturing Co. to manufacture Slimline Luminaires. The new firm is distributing *exclusively* through recognized wholesale channels.

Well-known in the electric appliance industry, Clyde was formerly in manufacturing and wholesale distribution in San Francisco. For the past two years he has been general sales manager for the western branch of a large lighting equipment manufacturer.

Bob, recently factory manager of the same firm, is an old timer in the Los Angeles area, having been in manufacturing there for 30 years.

The new Allen & Olsen luminaires are already moving into the western market, with outstanding acceptance assured. Functionally designed and engineered for the job, A & O fixtures will stimulate *your* sales. NEW, attractive, easy-to-hang luminaires are made of aluminum and unbreakable plastic. No maintenance problems here!

WRITE TODAY FOR FULL INFORMATION

A·O ALLEN & OLSEN Manufacturing Company

ALLEN & OLSEN MANUFACTURING CO.

13452 West Washington Blvd. • Venice, California

BE SURE TO SEE OUR SLIMLINE LUMINAIRE EXHIBIT

EXHIBIT SCHEDULE

LOS ANGELES
Mayfair Hotel
(Lounge Room—Mezzanine Floor)
Oct. 20 thru 23

SEATTLE
Olympic Hotel
Nov. 17 thru 19

PORTLAND
Benson Hotel
Nov. 10 thru 12

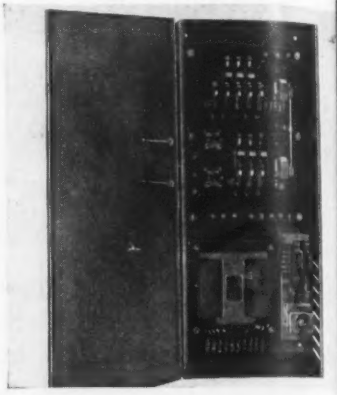
SAN FRANCISCO
Merchandise Mart
(Green Room)
Oct. 27 thru 30

SALT LAKE CITY
Utah Hotel
Dec. 1 thru 3

DENVER
Albany Hotel
Dec. 8 thru 10

A-C Motor Starters

Ward Leonard has added Bulletin 465 automatic motor starters. These are of non-reversing autotransformer type desig for single-speed 2- or 3-phase squirrel-c induction motors driving pumps, fans, sets, compressors and other equipment.



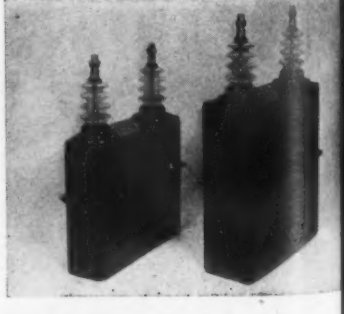
drip-proof enclosed starter is compact arranged in three removable sections. justable time limit acceleration, overload tection, mechanical and interlock protec and adjustable taps on the autotransfo are provided. Suitable for 2- or 3-wire trol, these starters are available in stand sizes for squirrel-cage induction motors to and including 100 hp., 550 volts, 60 cy

Distribution Transformers

Allis-Chalmers has announced an impro line of distribution transformers, incorpo ing time-proven design plus new light-we construction techniques. The new desig said to represent a 17 to 46% saving weight, with corresponding reduction in These transformers are engineered to recommendations in the revised second port of the EEI-NEMA Joint Committee standardization of distribution transfor from 1½ to 100 kva, 2,400- through 15 volt classes.

Capacitors

G-E has 25-kvar. Pyranol distribution pacitor units for individual and group mounting, similar to the individual type 10- and 15-kvar. units standard in companies. It is stated by G-E engineers 225 kvar. may now be accommodated on



crossarm instead of the 180-kvar. limit smaller rated units. Since the increase size is relatively small, the new capac may be used on the hangers for 10- and kvar. units, the company reports. Cast bushings are used.

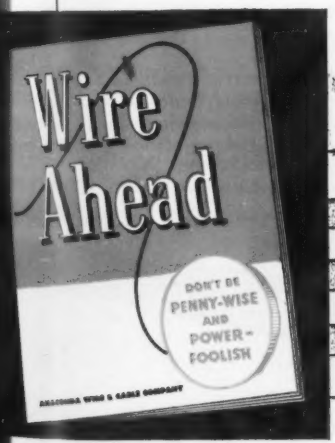
He pulls production DOWN!

INADEQUATE WIRING, the industrial jinx, upsets the best of calculations—the most thorough planning.

Production quotas are a fiction, the most modern machines are inefficient, the best of workmen are frustrated when overtaxed, over-extended obsolete wiring can pull down plant efficiency 25 percent* or more.

To get the production curve up, ask your plant power engineer, your consulting engineer, electrical contractor or utility power salesman to put this demon *out*. Action now may save shutdowns and costly alterations later.

47456



WIRE AHEAD, a new booklet discussing eventive maintenance . . . the symptoms inadequate wiring . . . and presenting ns for anticipating electrical demand, is w available on request. Address Advering Department, 25 Broadway, New rk 4, N. Y.

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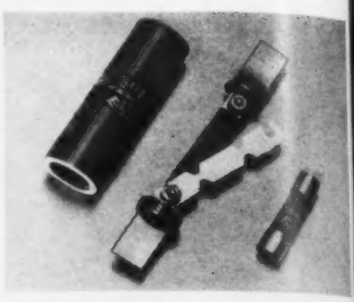
Beste-Wire

Cartridge Fuses



Solar Electric Corp. is offering a new li of renewable cartridge fuses for shockpro servicing and rapid renewal. The knife-bla type fuse has two main parts, a cartrid case with no exposed ferrules or bolts and link-blade assembly. Available in sizes fr 3 to 600 amp., 250 or 600 volts; Unde writers' approved.

Covers

Wiremold has added a series of eight co ers for use with its No. 3000 raceway a designed to take single receptacles, dupl receptacles, tumbler switches, surface d vices, screw-type and surface-type sign r ceptacles, condulet devices, fixtures and dr cords. Each cover is equipped with t mounting straps which snap around th beads of the raceway base and perform th double duty of providing the mounting f the device and for the cover itself. The co ers are 4⅝ in. long with the exception the condulet device cover which is 5 in. lon

Terminal Block Kit

Curtis Development & Mfg. Co. is marke ing a terminal block kit for experiment work and maintenance. It is stated th from one to 14 terminals can be produce for use where temperatures do not exce 400° F. Kit No. 200 contains molded se tions, terminals and screw assemblies; K No. 201, end brackets, partitions, thread rods, screws, nuts and washers.

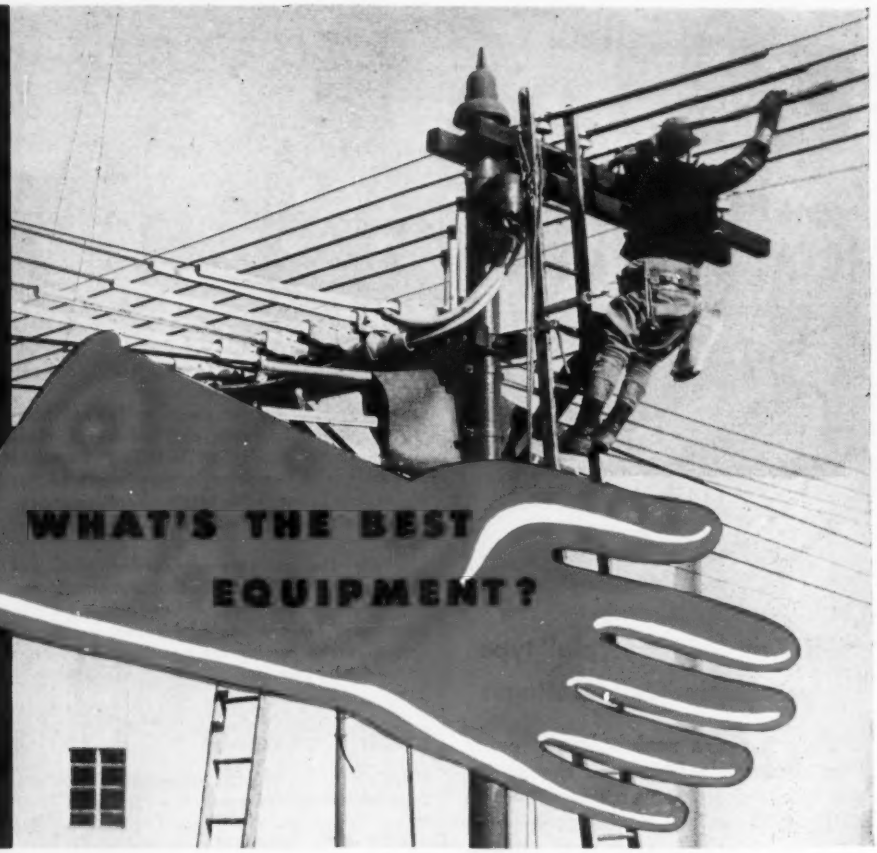
Bus Duct

Federal Electric Products Co. has add a bus duct to its Federal Noark line. Th duct has plug-in openings on 12-in. center is manufactured in standard 10-ft. length ready for installation.

Street Light

A football-shaped street light designed t cut night-driving hazards has been put in production by Westinghouse. It takes th 400-watt, 20,000-lumen mercury lamp and claimed to direct 20% more light to the ro surface than the former mercury units an at the same time to protect the motori from glare. This luminaire is being co structed also for use with incandescen lamps. Optical system of the new OV-20 co sists of an aluminum reflector and a gla oval-shaped refractor.

For your linemen's safety and efficiency...



All the GraybaR lines are fully field-tested

You want your linemen to be safe on the job — and you want them to do the best possible work in the shortest possible time. From the products of leading manufacturers, Graybar has carefully selected a complete line of safety equipment and linemen's tools which will fully satisfy your requirements.

Perfected through years of field experience and made of first-quality materials, these products include Salisbury line hose, rubber insulator hoods, rubber gloves and protector gloves, rubber blankets, sleeves, and a static-resisting line coat; Klein's safety straps, tool belts, climbers, and linemen's tools; M.S.A. first aid kits; and all the other items your linemen need for safety and efficiency.

The near-by Graybar warehouse is a convenient source of all types of pole-line materials and supplies. Your Graybar Representative will gladly help you get the best selection for any line construction or maintenance project. *Graybar Electric Company. Executive offices: Graybar Building, New York 17, N. Y.*

4783

Want your order filled by our stockholders?

Whenever you order anything electrical from Graybar, your requirements *do* receive the personal attention of our stockholders. Graybar is wholly owned by its operating personnel. That's one reason why Graybar people —together forming a huge, nation-wide organization — apply to each job the sense of personal responsibility you associate with a small, well run, *local* business.

47101

Everything for your Pole Lines via GraybaR

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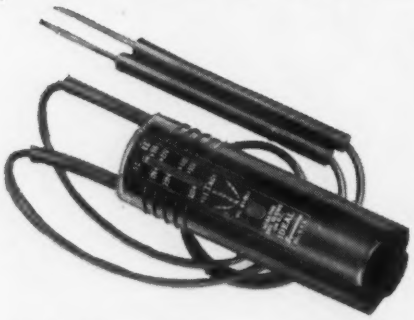
POLES • CROSSARMS • STRAND • INSULATORS • HARDWARE • PROTECTIVE DEVICES • LINE TRUCKS • CONNECTORS • TOOLS

ELECTRICIANS
MAINTENANCE MEN
CONTRACTORS
RADIO SERVICE MEN

YOU NEED THIS NEW *
IDEAL Voltage Tester



*NOT an ordinary "glo" type
—actually indicates voltages

Here it is—a real voltage tester that accurately indicates the nominal line voltage on an easy-to-read calibrated scale. Combines a solenoid voltage indicator *and* a neon test lamp for *double protection.*

FOR TESTING . . .

Continuity of Circuits (AC or DC)
110 to 550 v. AC
110 to 600 v. DC

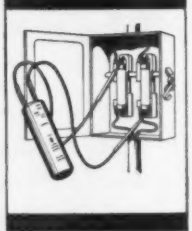
Blown Fuses

Grounded Side of Line, Motor or Appliance

Excessive Leakage

Frequency (25 or 60 cycle)

DC Polarity



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BULLETINS ETC.

Laundry Centers (1013)

Data for architects and builders who wish to incorporate planned laundry centers in new and existing apartment houses and other types of multiple dwellings is offered in a booklet issued by the Westinghouse Electric Appliance Division and ALD Inc., formerly Automatic Laundry Distributor Inc.

The 8-page booklet contains tables showing space requirements, and hot water, electric and gas loads for installing Laundromat-equipped laundries in apartment houses of various sizes and types. Ventilation requirements for clothes dryers are also discussed.

Under the self-service laundry plan described in the booklet, the owner of the apartment house can either purchase the equipment for the use of his tenants, or he can have the equipment provided by an independent operator.

Electric Governor (1014)

Details of an electric governor of new design providing accurate control over a wide speed range for G-E Type DE turbines are described in GEA-4764, a 4-page, 2-color publication issued by the General Electric Co. Salient features of the governor's components are shown in cutaway photographs of the unit's interior. A schematic diagram illustrates the interrelationship of speed sensitive element, control panel, and relaying mechanism.

Insulators (1015)

Ohio Brass has issued Insulator Catalog No. 26. In addition to the catalog section is a picture section showing steps in the manufacture of Ohio Brass insulators.

Insulation Testers (1016)

James G. Biddle has published a manual of up-to-date information on insulation resistance testing and how to use the va types of "Megger" insulation testers. It tre the testing of various types of electri equipment, including preparation of appara for test and safety precautions. Data included on test leads, effect of capacita operating time, surface leakage and use the Guard terminal.

Line Construction Tools (101

Utility line construction and maintena tools and equipment are covered in an page booklet issued by Four Wheel Dr Auto Co.

Transformers (101

Features of its distribution transformers given in a 36-page booklet available fr Line Material Co. The company's facilities engineering research, tests and the L "round wound" process are described in Bulletin 16-G-1.

Pipe Supports. (101

A data sheet on its roller pipe supports available from Unistrut Products Co.

Lighting (102

A leaflet issued by Edwin F. Guth emp sizes the importance and value of good lig ing by pointing to the effects of bad light It defines symptoms and describes the haza of bad lighting with illustrations of driv on a dark, rainy night.

Aluminum for Fixtures (102

Advantages of aluminum for lighting tures are cited in a 12-page booklet prepa by Reynolds Metals Co. and distributed General Electric Co. Points are numbe and illustrated by sketches.

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G & W ELECTRIC SPECIALTY CO., 7780 Dante Ave., CHICAGO 19, ILL.

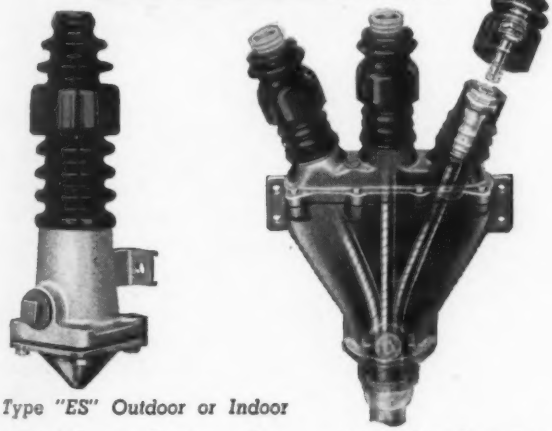
POTHEADS

WEBSTER—Pothead (pŏt'-hĕd) n. Elec.—A form of terminal hermetically sealed to the sheath of an electric cable for making a moisture-proof connection between the wires within the cable and those outside.

Electric power and light cables are insulated with paper, varnished cambric and rubber compounds and sheathed with lead, rubber jacket or braid (each with or without additional protective armor).

Cables are terminated in POTHEADS to seal the ends against entrance of moisture and leakage of paper insulated impregnating oil. Potheads provide electrical and mechanical protection to cable ends and a neat support with means for making connections. Where moisture and oil sealing is not essential, as in the case of some rubber compound insulated cables, potheads reduce the space required for a cable termination because compound in the pothead improves the electric strength of the creepage path on the cable insulation.

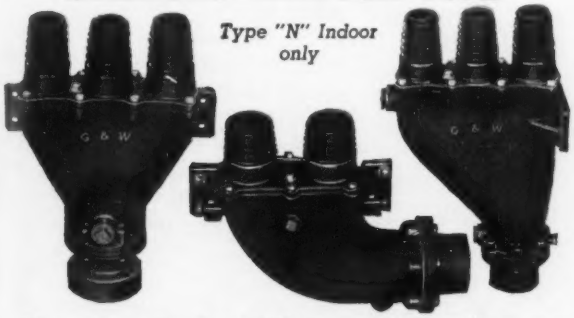
DISCONNECTING TYPE



Type "ES" Outdoor or Indoor

Aerial conductor plug contact (enclosed in porcelain cap) is detachable from cable conductor socket connector (sealed in porcelain tube). This disconnecting feature is the basis of many electric distribution systems to provide convenient and economical means for sectionalizing circuits.

STRAIGHT THROUGH TYPE



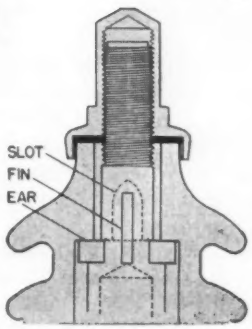
Type "N" Indoor only

Not a true "pothead" because no sealing connectors are included to complete the hermetic seal. Used indoors on cables which do not have oil impregnated insulation.

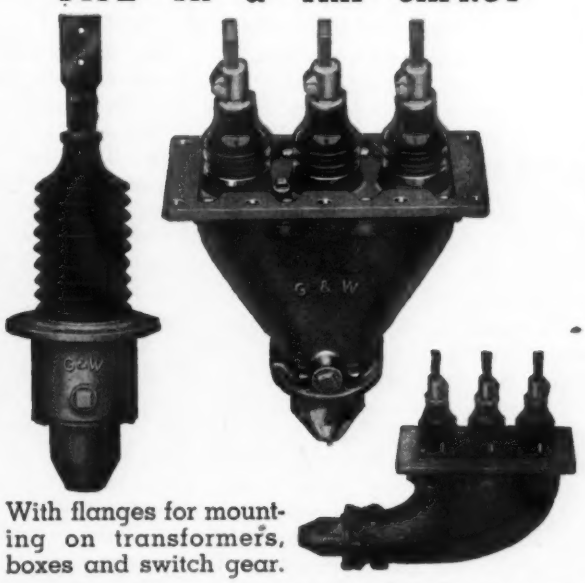
CAPNUT TERMINAL TYPE

Type "T" Outdoor — Type "NT" Indoor

Closed capnut completely covers connector threads. "Resistoyl" gasket seals top end of porcelain. When installing, screw capnut ¾ turn beyond the point of contact of the flange with the gasket. This compresses gasket to ⅔ its original ⅛" thickness. Elasticity of gasket maintains permanent seal.



TYPE "TR" & "TRA" CAPNUT



With flanges for mounting on transformers, boxes and switch gear.

This is a page from our new Bulletin 147 | Potheads, Boxes, Oil Fuse Cutouts and Oil Switches. Send for your copy.

ELECTRA'S HUSBAND

COME AND GET IT

WE have some great discussions around that table. Too bad more people aren't around. They'd learn lots of the tricks of the trade from these old-timers in the merchandising game. But they wouldn't find any unanimity. Opinions are just as individual as those who hold them. Good thing too that Electra can't listen in. She'd learn why she falls for salesmanship.

There's Guy, who doesn't say much but when he does, comes forth with comments that have a twinkle in them. There's Eli, who talks fast and earnestly and has hard-boiled ideas as to people and methods. And Adrian who likes to put some flourish into what he does. There's Mac from the power company, trained to listen more than give out. Anyway he isn't selling merchandise, so isn't in the same class as the experts.

Others join the table from time to time, manufacturers' men, wholesalers, other dealers. Often they provoke the discussions that emerge from this experienced crowd. More often they are put on the pan these days of short merchandise. It certainly is different from the days when *they* had these dealers on the spot to give them more sales. Even Mac has to take it now and then and has to keep quiet because his company is a little hard pressed for electricity in some spots. No pounding these merchandisers now to sell more appliances in order to burn up more kilowatts. The shoe is on another foot.

Guy had Mac squirming when he asked him if he shouldn't start selling LP gas stoves—it wasn't any use selling electrics if Mac's company couldn't hook them up. Of course Mac wasn't on very good footing himself. His company sells gas too—but out of a pipe instead of a bottle.

To pull the heat off good-natured Mac, I pointed out to Guy that the power company wasn't the only outfit that was out of things—or complicated when it comes to getting some service. Guy winced. With good reason.

Electra had instructed me to get a new cover for the ironer roll. It was during the war, but Guy had assured me they had the things in stock. So I had gone to his brand-new appliance department. I asked one of the "salesmen." He knew nothing about such mundane things. He called another "salesman." They held a conference and referred me to a hostess on the main floor. I went to the hostess. She referred me back to the appliance department. By this time I wondered if I were a basket ball being dribbled.

Guy came along and saved me. He called the stock room. None of the others seemed to know enough to do that. Yes they had one. I went upstairs to a fancy cashier's cage to wait while the machinery worked out of its depths somehow one only ironer roll cover. It was evidently quite a novel thing those days to sell anything, so a considerable ceremony was made over it. I paid at one window and went to another to wait for the package. After a long time it came—and we were matched up, my sales slip and the package and I was served. Guy has a red face whenever he thinks of it.

This set Eli off on one of his explorations into merchandising hocus pocus. He doesn't go for frills.

"It's a lot of nonsense. We doll the place all up and get so fancy we trip all over ourselves. What does the customer care about all such stuff?

"All the customer wants is two things: (1) The merchandise and (2) a good price. All the rest just gets in the way."

"Ah, I don't go for that," said Adrian. "People like nice surroundings. Look how they go for these new stores. You wouldn't see smart outfits like Magnin's and Macy's spend all that money for new and different stores and displays if it didn't pay."

"That's all right but it's all wasteful. It isn't necessary. Look at groceries. They make it easy for you to come take 'em away," said Eli.

"Yes—but look at the way *they* are dolled up too—look at that big Lucky Market in San Leandro—Did you ever see anything like it?—"from Adrian.

"But it's still 'come and get it.' The stuff is all laid out and people go in and serve themselves. You talk about a lot of salesmen and a lot of rigmarole. I say that all people want is the *merchandise* and the *price*. You could just have an empty lot with a wire fence around it and the appliances all set out, with price tags on them. People would come in, pick out what they want. They would take the tag to a cashier—pay for it and have it delivered."

Adrian almost exploded. "You're crazy! When that day comes, let me out. I don't want any of it. This selling business is more than a wire fence around the merchandise and a cashier. When it comes to that I'll go shoot myself."

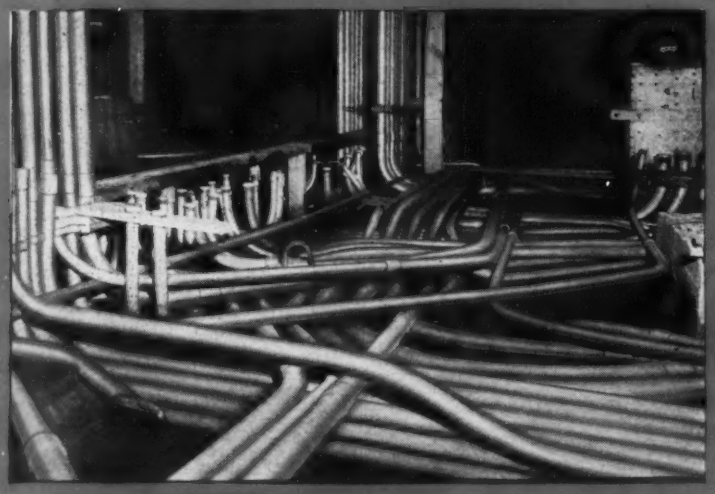
Electra, fickle gal that she is, shops at all kinds of places. It's a good thing, for her, isn't it, that there are differences of opinion among those who seek to serve her.

THE other evening Electra was late returning from her downtown shopping, and dinner preparations were a few minutes behind schedule. At such times it is within the realm of possibility to be drafted as emergency labor reserve: sure enough, with a curt "you want to eat tonight, don't you?" she placed before me a pan full of potatoes and the old potato masher. First reaction to this primitive tool of brute force was an amazed "but don't you use your mixer for this job?"

"Heavens, not when I'm in such a rush," Electra replied, "it takes too much time to get it out and put it away again." Knowing from long experience the futility of argument under pressure, I just glanced at the clock on the wall and noted how long it took to pulverize those spuds into a smooth, creamy mass with only a lump of calories here and there. Next evening Electra willingly listened to reason. With one eye on the clock she unwound the mixer, pulverized the spuds (no lumps), cleaned and put it away. The whole job took about one-fifth less time than the night before. "I told you so" doesn't go around our house, but that mixer hasn't stayed in its corner one night this past week.

Extra years of protection with G-E RIGID CONDUIT

G-E WHITE G-E BLACK



To get the kind of long-term protection that wiring should have — to give your customers assurance of extra years of conduit life — make sure that every inch of rigid conduit you install is built for extra years of service. That sounds like a tough inspection job. But it's not — not when the conduit you use is G-E Black or G-E White. On both types of rigid conduit, the General Electric name is the sign of *that extra measure of service* you and your customers want.

For Extra Protection from Atmospheric Corrosion

Smooth-surfaced General Electric White tells you at a glance that it won't give corrosion a foothold, because that finish is tough, hard Glyptal* lacquer. And under that coat, a layer of pure zinc, *hot-dip* galvanized by an original General Electric process, makes a firm bond with the steel conduit. The hot-dip process gives you the protection of zinc inside and out — Glyptal lacquer gives an additional protective surface — for the extra life you want in rigid conduit.

For Extra Protection from Chemical Corrosion

For conduit runs in chemical laboratories, plating rooms, canneries, meat packing plants, and other installations where fumes are a threat, take advantage of the *extra protection* of General Electric Black. Its black-enamel finish has a chemically inert asphalt base, specifically selected for its resistance to corrosion. For lasting protection, it's baked on — inside and out — on General Electric Black.

To get these long-life advantages, to assure them to your customers, specify rigid conduit by name — General Electric Black and General Electric White. Section C65-1025, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

RACEWAYS ROUND-UP

from your

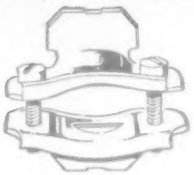
Merchandise Distributor

All You Want — We can ship from stock insulating end bushings, sleeves, and inserts

for all wiring installations. Made of a strong laminated insulating material, they are unaffected by normal heat, moisture, and corrosive vapors. Use them at outlets, switchboard knockouts, and wherever codes require, for lasting protection to wiring.

For Wiring Flexibility — When concrete office buildings, plants, hospitals, and other construction jobs call for wiring that can meet changing demands, look into the advantages of Fiberduct underfloor raceways. Fiberduct can be installed with ample outlets to meet original requirements, and more outlets can be added at any time, on centers as close as six inches. Investigate nonmetallic, noncorrosive Fiberduct raceways for construction jobs on buildings that must stay electrically young.

Nonmetallic-Cable Connectors — Also ready for immediate delivery are General Electric nonmetallic-cable connectors. Exclusive locking flange slips into box knockout easily from outside. Just insert cable and tighten two screws. Fits all common types of PVX and BraidX.*



A Full Line Of Conduit Products — Any General Electric merchandise distributor can give you information on General Electric's full line of conduit products. If you need specifications or working data, give us a call—or write to Section C65-1025, General Electric Company, Bridgeport 2, Conn.

* Trade-mark Reg. U. S. Pat. Off.

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Multi-breakers

Federal Electric Products Company, Manufacturers of a Complete Line of Electrical Products, including Motor Controls • Safety Switches • Service Equipment • Circuit Breakers • Panelboards • Switchboards • Bus Duct

OCTOBER 1947 Vol. 99, No. 4

ELECTRICAL WEST

Fuel-Power Outlook—Pacific Southwest

With oil and gas diminishing in supply and only 1,400,000 kw. of potential hydro remaining, Pacific Southwest looks to coal and atomic power as long-time energy sources

N. B. Hinson
Vice-President, Southern California Edison Co.

So phenomenal has been the growth of population and load in the Pacific Southwest Power area that power agencies must take a long-time view of the fuel-power economy of the area. What sources will supply the energy in 1965, when it is estimated that load will have doubled and that approximately 10,500,000 kw. of generating capacity will be required? With only about 1,400,000 kw. of hydro still to be developed to go toward making up the some 3,500,000 kw. of additional generation that will be needed, attention turns to fuels. What kind and from where? An attempt will be made to answer these questions later in this article.

Historical Background

Since the future is foreshadowed to an extent by developments of the past, it is well to review a bit of history for background. This area has had a high percentage rate of increase in population for many years. Shortly after it became a part of the United States the discovery of gold started the first migration to the Southwest. In 1850 this territory had a population of approximately 100,000 people. As a rapid rate of increase in population is one of the major problems in the supply of electric energy it is significant to see how this area has grown since 1850.

Year	Population
1900	1,600,000
1920	3,800,000
1940	7,500,000
1947, approximately	9,500,000

This shows a 27% increase from 1940 to 1947 for the area, while the United States shows only 7% increase.

In the early stages of development of the Pacific Southwest the country was primarily pastoral, and the population which it could support was limited. Use was soon made of the natural streams for irrigation and, with the more or less semitropical climate in much of this territory, agricultural development was very rapid. This created employment for many more than in the pastoral period. With the advent of electric service in this region, just before the beginning of the century, power was available for pumping water from underground supplies, which gave added impetus to the agricultural development and with it brought more people.

By 1914, when the first World War began, some industrial activity had appeared in much of the territory. This again provided employment for more people. The area was widely advertised as tourist country and many who came to enjoy its climate stayed or came back at the first opportunity of profitable employment. As these changes were taking place it was possible to support more people.

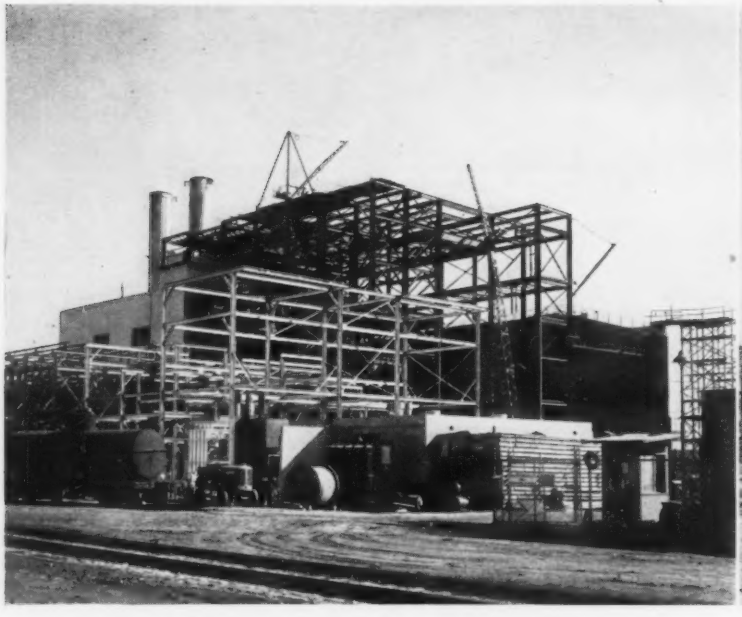
The depression years slowed this growth to a certain extent but never stopped it. The airplane and shipbuilding industries were very active for many years, but with the start of World War II these industries were expanded at an unprecedented rate, and incidental plants necessary to them sprang up over the whole area. This rapid rate of growth has been a problem for many years, but during the war it was greatly accelerated. It now appears that it will be a problem for many years to come.

The electric power industry in this area started as it did in many other sections of the United States, with arc lighting and later with a small amount of direct current in a very few of the larger cities, and alternating current in other cities and outlying territories. No coal was available for fuel and very little oil so that the pioneer utilities quickly turned to water power which was available in the foothills and mountains. The 2,200-volt system, which was used in the cities for alternating current distribution at the time, was inadequate to bring the power from the mountains. Therefore a great deal of the early pioneering work on the long-distance high-voltage transmission of power was developed in the West.

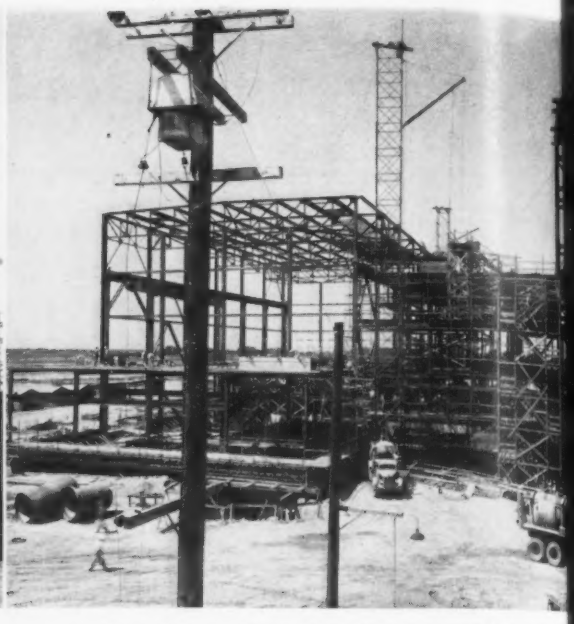
Much of the land in the Pacific Southwest, prior to development, was semidesert with low rainfall compared to the eastern part of the United States. The water supply came from the high mountains where winter snow melting in the spring provided the water supply. This whole region is subject to wide variations in rain and snow in the mountains which produces wet and dry years, which introduced another problem in the utilization of hydroelectric energy. A few dry years around the turn of the century forced a number of small utilities to install steam plants to carry the load. Some of these were actually installed in the hydro plants.

Discovery of large oil and gas fields in California changed the picture for awhile so that practically all of the systems depending upon hydro plants in the mountains installed steam plants

* Includes all of California and Arizona and those parts of Nevada interconnected with California systems.



Silver Gate Steam Plant, San Diego G & E



Kern Steam Plant, Pacific Gas and Electric

in the cities at the terminus of the transmission lines. These were used for helping to carry peak loads and for protection against dry years.

Most of the early hydro plants were stream flow which aggravated the wet and dry situation. As the art developed storage reservoirs were made an integral part of the hydro developments. By storing flood waters in the spring and using this water for carrying loads during the balance of the year, much better load factor was obtained on the hydro plants.

The use of steam plants in connection with water power plants in this region made possible the maximum use of hydroelectric energy. The correct balance between hydro and steam generating plants produces the most economical over-all system.

War Impact

At the time war was declared in December 1941, additional generating capacity was planned and on order for much of this territory. Very little hydro capacity had been added in southern California since 1930, due to Hoover power plant coming into service the latter part of 1936 with approximately 400,000 kw. of generating capacity, which by 1940 had been increased to approximately 850,000 kw.

In the nation-wide plan of making critical material available to the war effort, all construction plans were analyzed, and as a result the Pacific Southwest Power Interchange Committee was set up in May 1942. Its purpose was to make studies of resources and loads, and determine what additions were absolutely essential and what could be deferred. On the basis of pooling all resources of the area, practically no additions to generating capacity were made except those which were so far along in the construction stage that no critical material could be saved by canceling them.

The steam plants in this area, which had been installed to protect against deficiency in hydro energy in dry years, were used to carry war loads. Fortunately no dry years occurred during the war so that in spite of the many new industries which moved into this territory, many requiring large blocks of power, practically all demands were met.

There had been much consideration in the area regarding the conversion period which was supposed would occur after the end of the war, when war plants were to be converted to peacetime operation. Also, it was thought that many of the people who came to this territory because of wartime activities would return home at the end of the war. Both of these assumptions were incorrect as there was only a slight reduction in electric loads for a short period, and from the continuing increase in population apparently very few of the wartime workers returned to their former homes.

One of the major activities following the close of the war was the rapid increase in the construction of housing. There was also a large increase in commercial establishments and a shift from airplane construction and shipbuilding to various other industrial activities. All of this activity created more load which made all the more necessary the installation of additional capacity which had been postponed during the war.

Orders for generating equipment which were suspended during the war were reinstated and new orders were placed for additional facilities. Due to the shorter time of getting steam plants in service, much of the new capacity was of this character.

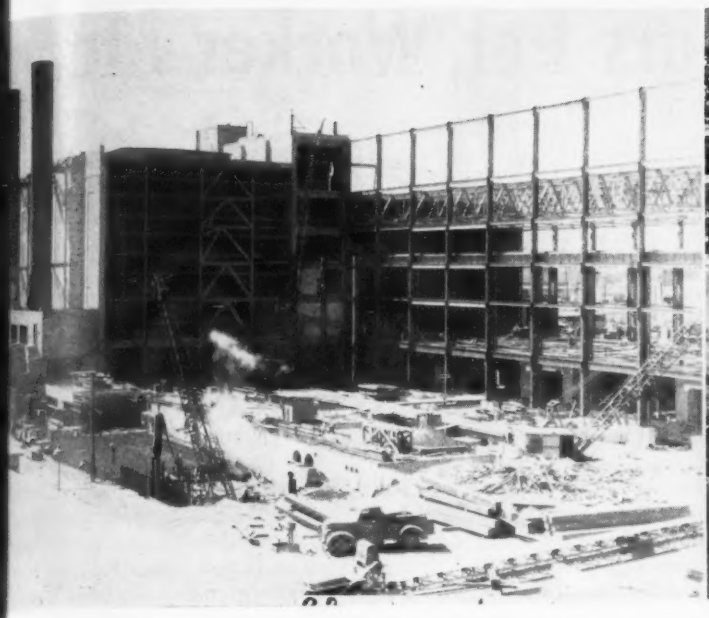
The Pacific Southwest Power Interchange Committee is still functioning as it did during the war. This committee did a very satisfactory job during the war in pooling the resources of the whole area, and under the present load conditions there is still a job to be done until additional generating capacity is installed which will increase the margin of reserve between load and capacity.

The present installed capacity in the whole areas at the end of 1946, in round figures, is

Hydro	3,300,000 kw.
Steam	1,700,000 kw.
Total	5,000,000 kw.

The peak load in 1946 for the area was 4,150,000 kw., and it is expected to be 4,600,000 kw. in 1947. This seems like a comfortable margin of reserve for these times, but some of the hydro is stream flow and drops off in the late summer and fall. Also, some of the hydro with stored water is limited in a dry year to peaking capacity only, so that the actual capacity available to carry load in the fall of a dry year is less than the installed capacity shown above.

The additions on order, and under construction in the area, for the years 1947, 1948, 1949, and 1950 amount to approximately 930,000 kw. of hydro, and 1,150,000 kw. of steam, or a grand total of additions of 2,080,000 kw. By



Harbor Steam Plant, City of Los Angeles

Redondo Plant, Southern California Edison

the end of 1950 the total installed capacity will be—

Hydro	4,230,000 kw.
Steam	2,850,000 kw.
Total	7,080,000 kw.

These additions are scheduled as follows:

Year	Kilowatts
1947	320,000
1948	860,000
1949	310,000
1950	590,000

Estimates based upon load growth experienced in the past, after discounting war peaks and the present high rate of growth, would indicate that load can be expected to double in 18 or 20 years, or by approximately 1965. These estimates are based on the assumption that our free enterprise economy will be preserved. But it does not mean that the population will necessarily double because per capita use has been on the increase and probably will continue.

The load factor in the area in general, is high, between 60% and 70%. During the war it was especially high due to the operation of many industrial plants on three shifts. With the large increase in domestic and commercial loads and the discontinuance of three-shift operation in most of the plants, the load factor will have a tendency to be lower. This will require more kilowatts of generating capacity. With double the present load, or approximately 9,000,000 kw., the generator capacity necessary will be approximately 10,500,000 kw. With 7,000,000 kw. total installed capacity by the end of 1950, it will be necessary to add another 3,500,000 kw. of generating capacity to carry this increased load.

An analysis of the potential possibilities in the area indicate that on the Colorado River within economical transmission distance of southern California, are located the proposed Bridge and Glen Canyon hydroelectric projects. These two sites have a capacity of approximately 1,300,000 kw. as shown by some of the preliminary studies.

There is approximately 400,000 kw. of hydroelectric capacity that can be developed in southern California, and approximately 1,000,000 kw. in northern California. To supply the 3,500,000 kw. of additional generating capacity will require an additional 800,000 kw. of steam after all available hydro is developed in the area. This required additional steam capacity, with that now in existance and under construction, would make a total of approximately 3,500,000 kw. It may be necessary to have even more steam capacity to provide adequate protection against low-water years.

What Fuel?

This increased amount of steam capacity will require large quantities of fuel. Although practically all these steam plants are designed to burn oil or gas, a few of the more modern plants were so designed that, with a minimum of change in the boilers and the addition of the special equipment necessary, they could use pulverized coal.

A recent article on coal in the March and April 1947 issues of *Fortune* refers to large deposits of coal in Wyoming, Colorado, and Utah. These deposits are within 750 to 1,000 miles of most of the fuel-burning plants in the Pacific Southwest area. This article tells of the development work now in progress toward production of liquid fuels and by-product gas from coal. With rapid depletion of present oil and gas sources in this region and throughout the country, coal may have a very important bearing on the future generation of energy in this area. Experts assure us that the country has coal resources that will last at least 1,000 years, or 30 generations.

No one can think of fuel-burning plants these days without being reminded of developments in the field of atomic energy. At the present time most discussions regarding the future use of atomic energy in the production of electrical energy contemplate the generation of steam from atomic piles. If this form of energy should be used in many of the modern steam plants, it only will be necessary to replace the existing boilers and fuel-burning equipment by atomic piles and their auxiliaries producing steam. This would mean the replacement of only 25% or 30% of the investment in existing steam plants.

From this study it would seem that when the load in this area has doubled, practically all the additional generating capacity needed to carry the new loads from that time on, of necessity will have to be supplied by fuel-burning plants. With large coal reserves there is ample energy in sight for the long-distance future, even discounting entirely the very strong possibility of widespread use of atomic power within the next few years.

The Pacific Southwest then need have no worry over its future power supply. Water will be the limiting factor. But that is another story.

More Kilowatt-Hours Per Worker Mean Industrial Supremacy

Edwin Fleischmann
Consulting Engineer
Palo Alto, California

IT has often been said that the nation which places in the hands of its people the most abundant supply of electricity will have the highest standard of living. More kilowatt-hours per capita mean more energy to do the back-breaking tasks, more production per worker, and greater ability to provide those goods and services which make life easier.

If this is true of nations, may it not also apply to broad regions within the country? Let us look at the Western states in comparison with other parts of the United States.

The Far West has an abundance of low-cost hydroelectric power, ready to the hands of its growing band of industrial workers and homemakers. The electric rates in this region—always among the lowest—can be expected to continue to decline, because the potential productivity of electricity from hydro sources is five times that already developed. In the East, on the other hand, power costs may possibly remain static, but they are very likely to rise, because of the increasing fuel costs there, where steam plants furnish most of the energy.

Low electric rates are important to manufacturers in the West. It is often contended that the cost of power and fuel are not major items in the total value of manufactured products. Low prices, born of an abundance of these necessaries, however, make it possible for the West to grow industrially, and to place its products in the competitive markets of the nation and the world. If other operating costs, such as fuel and power, were not so low, Western manufacturers would not be able to pay the high wages they do. In California, for example, average hourly earnings of factory workers have been consistently substantially higher than the national average. They were 10c higher in 1939, 20.3c above it in May 1947, the latest complete month available.

Plants in the West could not absorb the heavy freight differentials, necessary to move their products to other parts of the nation. Many times, the balance between profitable business and no profit at all in competitive markets is measured in terms of a very few per cent of operating costs.

Not only must the West make goods for other markets. It has a rapidly expanding market right at home. The eleven Western states increased 24% in population between 1940 and 1946. This compares with a 4% growth in the North Central states, and less than 3% in Northeastern and Southern United States. Population means markets. Markets require industries and distribution. Industry means more workers, more pay rolls, more markets.

How ample has the supply of electricity been in the West? And what has it done for industry?

For years, the per capita production of electricity here has been far above that in any other section of the country. Chart 1 shows this situation back to 1930. Industrial development had much to do with the rise in electric consumption in the West. And the war caused a sharp upturn in the West's curve of industrial development. Large industries were located here, because there was plenty of power, and more which could be produced. Two large steel mills were built; half a dozen aluminum reduction plants went into operation; two plants were erected to make magnesium; numerous shipyards sprang into being; the aircraft industry zoomed. The roster of Western industries now includes almost all of the large national manufacturers. The list is growing daily; but, of equal importance to our economy are the small, independent industries which have been started.

Since the war, the Western states' curve of power production shows only a moderate leveling off due to reconversion. The impact of the readjustment period has been much less severe than was anticipated. The gains in kilowatt-hours per capita made during the war have been held. Between 1939 and 1946, the increase in electric consumption has been one-third greater

Chart 1

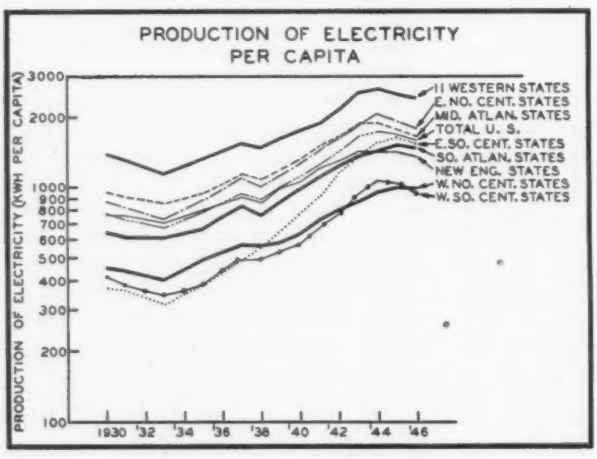
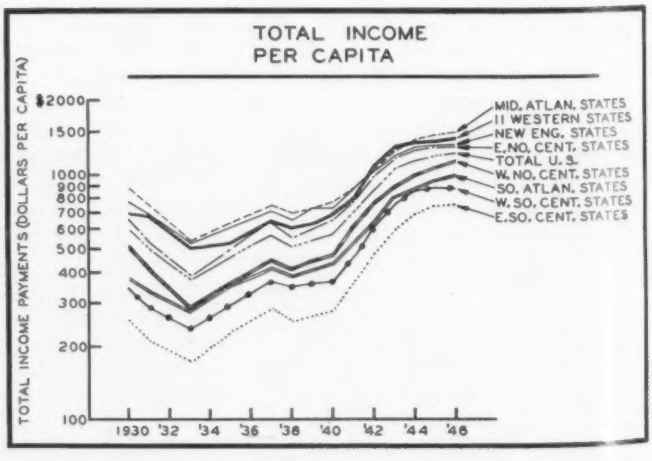
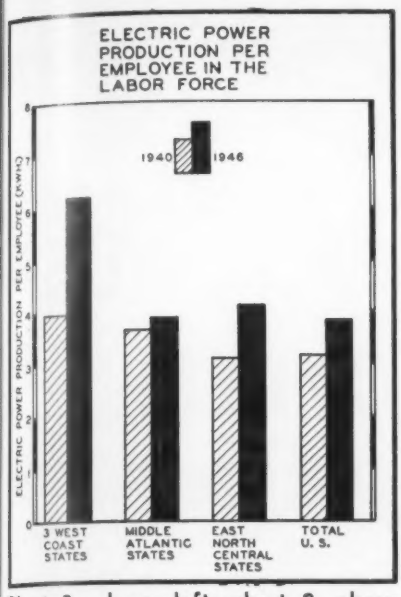


Chart 5





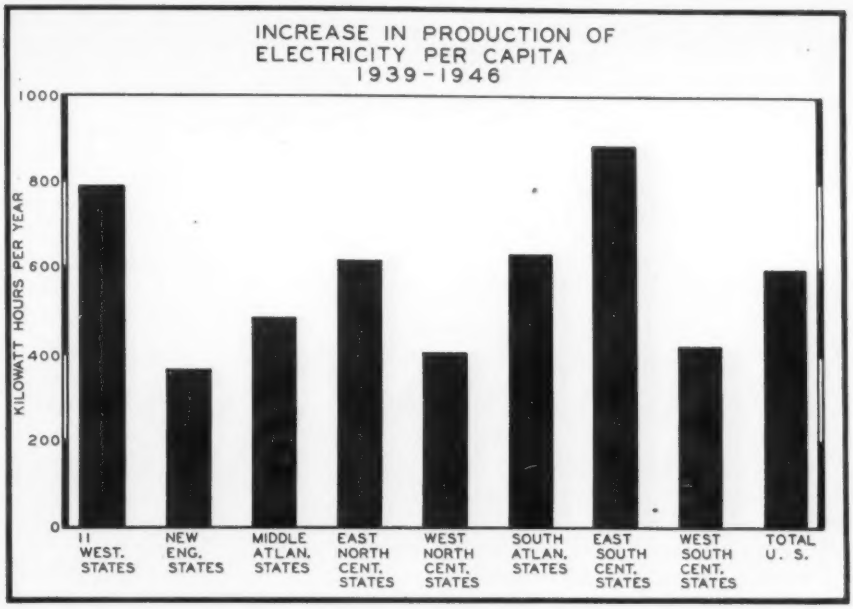
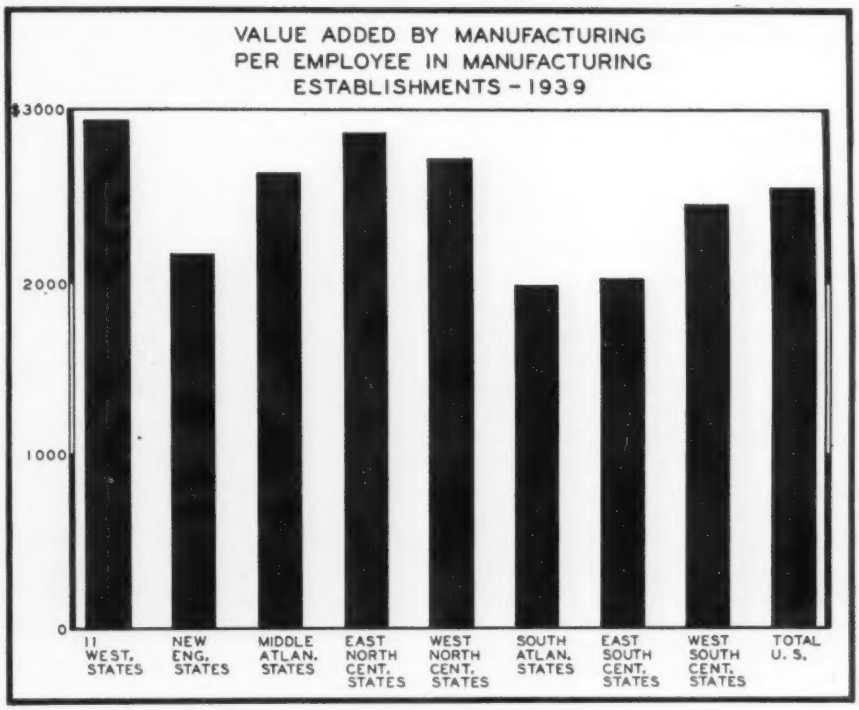


Chart 3, above left; chart 2, above right; chart 4, center; chart 6, below

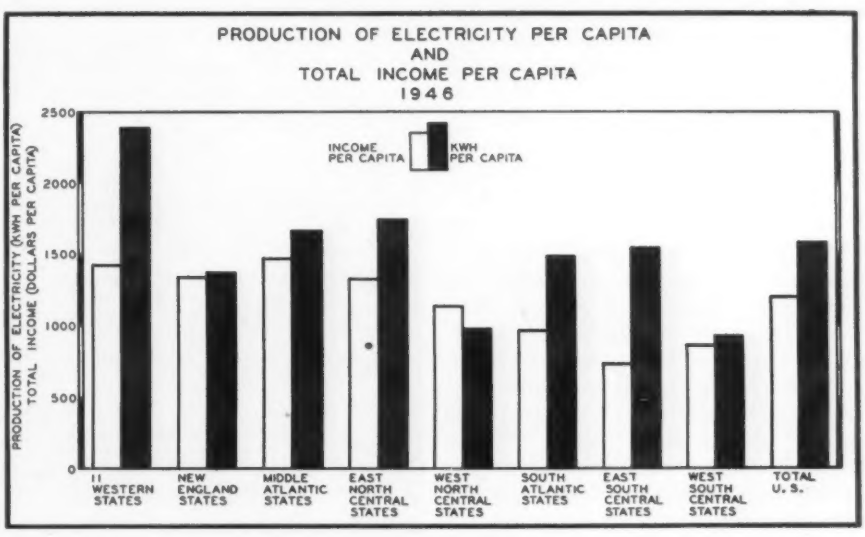


than the national average. Chart 2 indicates how outstanding the recent growth in the West has been.

Total electric power production in the West has risen much faster than the number of workers in the labor force. This means that each worker has had more energy at his disposal. Chart 3 compares two important industrial areas of the country, for which data are available, with the Pacific Coast states and the nation as a whole. The West was ahead in 1940; it is outstanding now.

In a factory, electricity enters into the process of manufacture. More energy available per worker should mean that each employee can produce or process more output. The only figures on value added by manufacturing are those in the 1939 Census of Business. In that year, the value added per worker in the eleven Western states was 17% above the national average, and higher than the figure in any other section of the country. (See Chart 4.) Such a statement may be misleading, if made for a small section of the nation or a city, since the value added by manufacture depends on the nature of the industries located there, as well as upon the productivity of the workers. In broad areas, such as those shown in Chart 4, however, the comparison between regions is much more valid, because a variety of industries is included.

More productivity per worker justifies more income. The per capita income in the West followed closely the national trend until the war began. Since 1941, it has increased rapidly, as Chart 5 shows. The Middle Atlantic



states are the only ones which have a slight lead over the West. It is well above all other areas, and is consistently higher than the national average, by a comfortable margin.

Electric production and income. The relationship, while not exact, seems clear. Charts 1 and 5 contain curves of similar shapes. To say which of the two started the spiral increase is like the old chicken-and-egg argument. But they are certainly closely tied together. For different parts of the country, in 1946, it seems inescapable that high electric production and high incomes go together. Look at Chart 6.

Industry in the West can capitalize on its abundance of natural resources. Its utilities and Chambers of Commerce have done outstanding work; but the important job ahead is to assure that the new industrial population and the new people it brings to the West have a permanent place in our expanding economy.

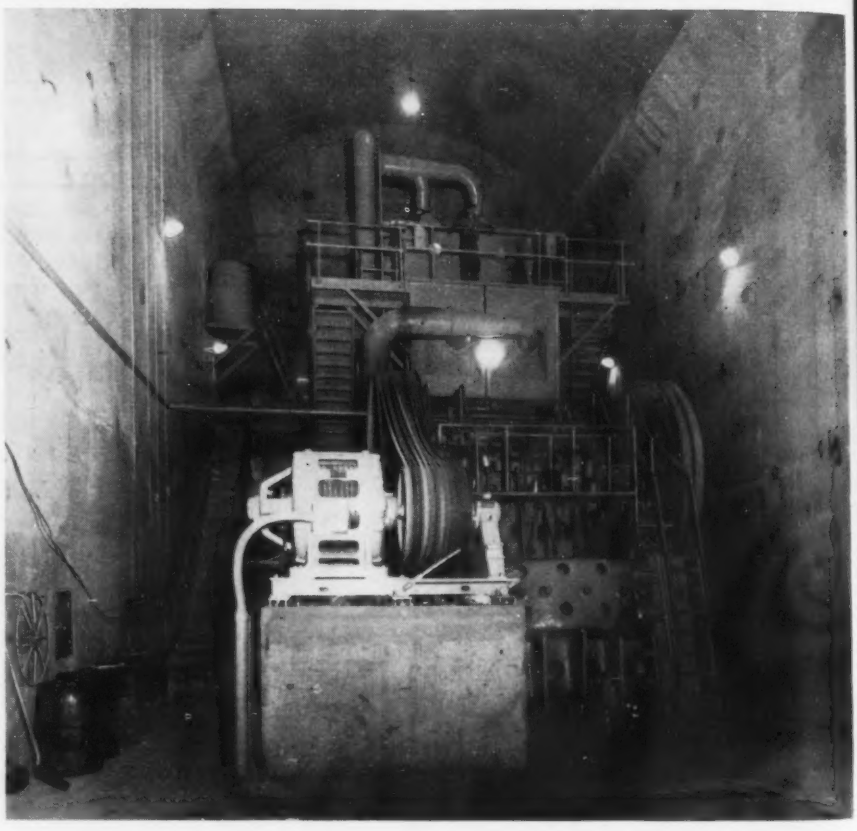
Permanency of the new prosperity will depend upon continued industrial expansion. The westward trend of industry will continue if there are markets, and workers, and a guaranteed supply of low-cost electrical energy. The West has all these things—plus climate—the master catalyst.

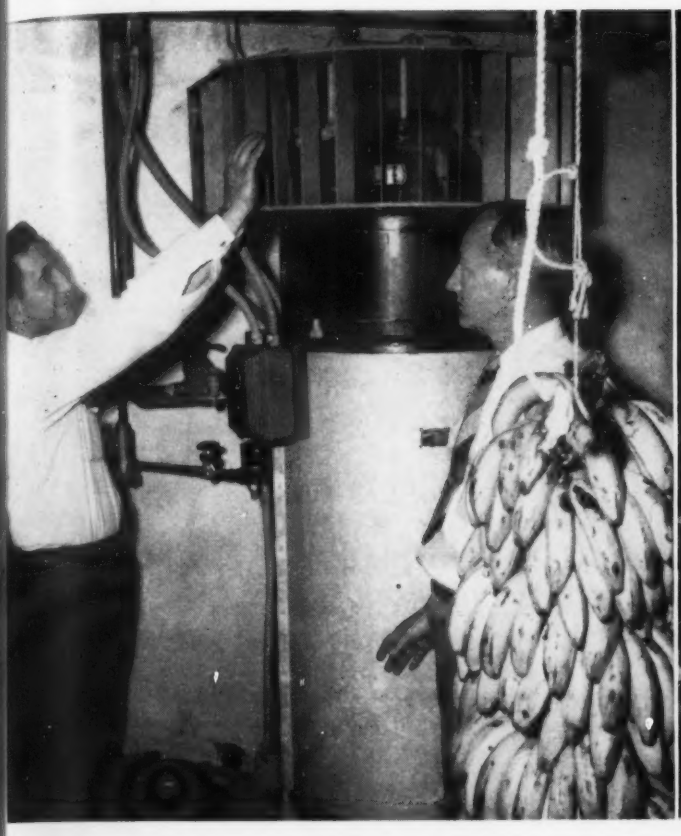
KILOWATTS MINE COPPER

CASTLE Dome open pit mine near Miami, Arizona, is literally a huge mountain of copper ore. To break this mountain into little pieces and concentrate its valuable ore requires a great deal of equipment and power. Electricity, which plays a vital part by supplying this power for operation of the mine and concentrator plant, is supplied from a 115-kv. loop circuit by the Salt River Valley Water Users. Substation which receives this power is shown with its bank of 10,000-kva. transformers at extreme left of overall view of plant. These transformers supply power at 6,900 and 2,500 volts for use throughout the plant—the mine itself, crushing plants, concentrator and water reclaiming stations.

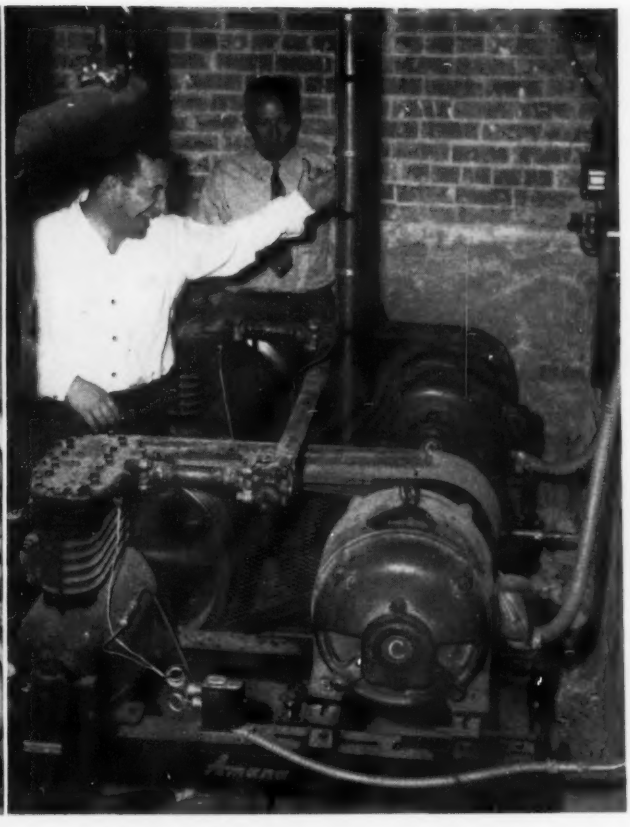
Power for electric shovels which load the ore on trucks is supplied through portable transformers and control equipment—300-kva. transformers in units complete with oil circuit breaker, relays, watthour meter, and capacitor tripping device. Trucks dump the ore into an open earth hopper over the primary crusher, which is driven by a 300-hp. slip ring motor. Crusher is located underground as shown, and is fed by a 10½-ft. Stephens-Adamson pan feeder, said to be largest ever built. Conveyor between primary and secondary crushers is driven by squirrel cage motors at both head and foot pulley. Total length of conveyor is over a thousand feet, two thirds of which is at an incline of 12° as may be seen in photo.

Power distribution of low voltage within the plant is accomplished efficiently through four 1,000-kva. and four 450-kva. power centers which minimize long conductor runs and objectionable voltage variation in low-voltage circuits. These units, along with the Westinghouse substation and motor and control equipment used throughout the plant, make an integrated and welled-planned installation. Castle Dome is another example of the successful electrification of this type of heavy industry.





Bananas are ripened under close control by heat supplied from reverse-cycle installation at Spector Produce Co. of Phoenix, Arizona. Air circulated by above unit in banana room is warmed by heat pumped from frozen food room and vegetable storage room Temperature, which must be raised one degree at a time, ranges from 50 to 76° F



Compressors which take heat from warm air pumped from low-temperature rooms, concentrate it, and then deliver it to rooms where bananas are ripened under close control. By utilizing this heat energy which would otherwise be dissipated, over-all thermal efficiency of combined cooling and heating operations of the plant is materially increased

NEW REVERSE-CYCLE APPLICATION

Bananas Ripened by Heat from Frozen Foods

SUCCESSFUL operation of the first commercial installation of reverse-cycle refrigeration in the food industry of the Southwest to ripen bananas with heat taken from frozen food emphasizes the importance of this new application of an old principle. Reverse-cycle equipment designed by Gay Engineering Co. of Los Angeles for Spector Produce Co. of Phoenix, Arizona, handles heat much like ordinary pumps handle water, pumping it from one temperature level to another to suit the needs of the operator.

Spector's warehouse has five storage rooms where temperatures may be maintained from 0° to 100° F. Under typical operation two compressors shown in photo pump heat from the frozen food room and the vegetable storage room into the three banana lockers. Frozen food room is kept at 0° F, vegetable storage room at 38° F, and banana room at 50-76° F so bananas can be ripened by a gradual increase in temperature, one degree at a time under close control. One of the units which bring heat to the banana rooms by circulating warm air is shown in the other photo. In addition to the compressors, the installation has five cylindrical evaporators which can serve either for cooling or heating operation, and an atmospheric condensing tower which eliminates the necessity for maintaining balance of heating and cooling loads in the various rooms. Without reverse-cycle equipment, heat pumped from the low-temperature rooms would be dissipated, and some external source of heat would be required to ripen the bananas.

Reverse-cycle units have been used for some time in straight winter-summer air conditioning for heating and cooling, and are being used to operate water heaters. Although there is still a great deal of development to be done in the comparatively new field, this type of equipment is about ready to enter the competitive market for commercial and industrial installations of the type described. Ever-increasing demand for facilities to handle frozen foods will provide a natural incentive for more efficient handling of the refrigeration required.

Frozen Foods Have Highest Kwh. Content

Frozen foods processed in three Pacific Coast states last year required 200,000,000 kwh. for refrigeration. It's big business for electrical industry in the West

Walter C. Heston
Engineering Editor, Electrical West

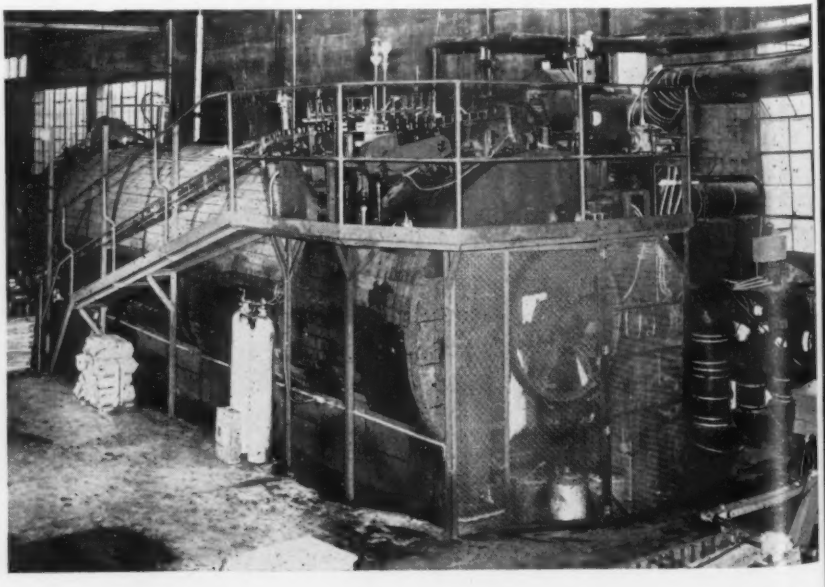
OF all the foods that reach the dinner table, those that have been processed by quick freezing have the highest electrical energy content. Of that there can be little doubt. This is because electrical energy used in freezing and holding foods in a cold environment all the way along the line to the consumers' table is superimposed upon all other energy that may have been expended in growing, processing and marketing of foods.

No attempt has ever been made so far as is known to determine how much energy is required to produce a pound of product in this rapidly expanding frozen food business. ELECTRICAL WEST made a study and has determined approximately this energy content. As expected, the results were quite revealing. Through the cooperation of one of the largest commercial refrigeration companies in California, a figure has been obtained. Analysis of its records show that every ton of food quick frozen and held in zero storage for an average of six months has had expended on it 317.45 kwh. For the conditions assumed this is broken down as follows:

Electrical energy required to cool and hold one ton of fresh product (fruits or vegetables) in storage for two weeks prior to processing	25.20 kwh.
Electrical energy required to quick freeze (at about 35° below zero) one ton of product	108.91 kwh.
Electrical energy required to hold one ton frozen product (at about zero) in freezer storage for an average period of six months	183.34 kwh.
Total per ton	317.45 kwh.

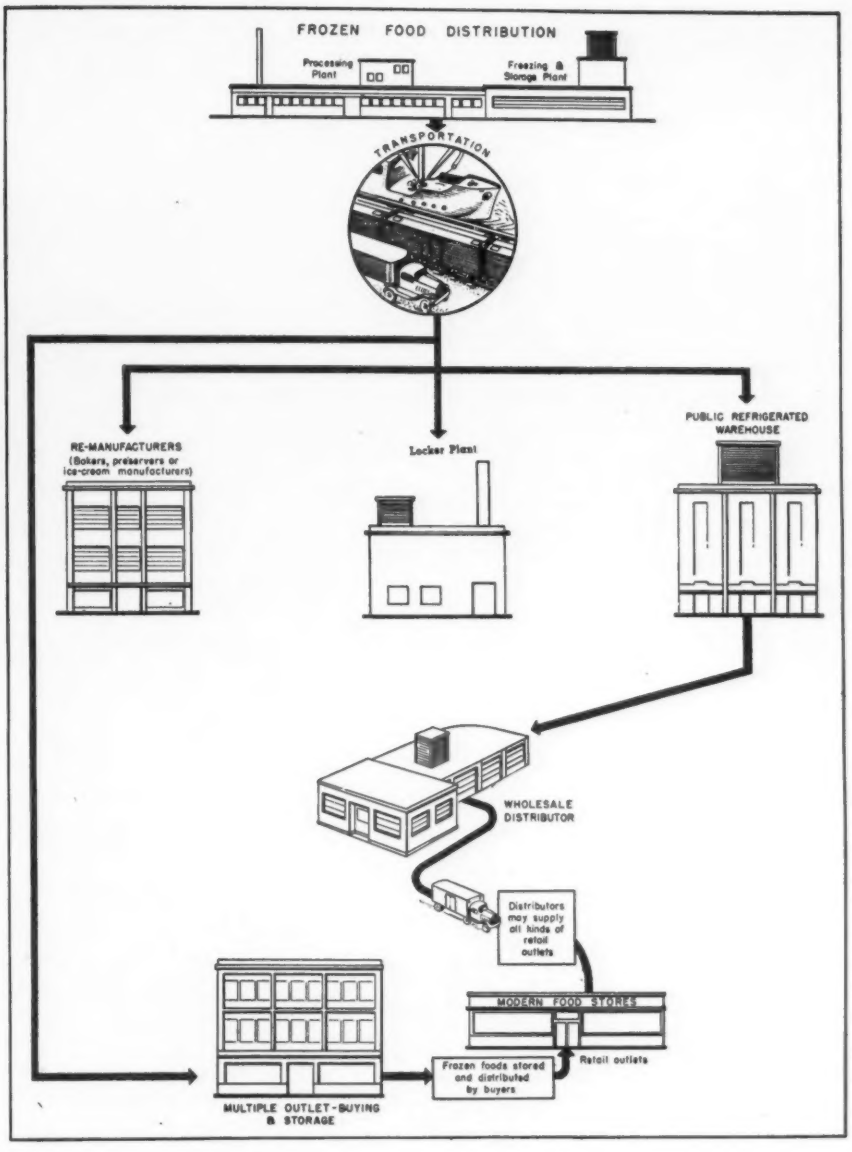
Conditions for which these figures apply, i.e., holding, freezing and storing in the same plant, are obviously ideal to secure the lowest energy figure. The average pound of frozen food before it reaches the consumer passes through several hands and must be held in a very low temperature environment in a number of different places enroute. Therefore, the average kwh. content is actually much higher than the .163 kwh. per pound indicated by these figures. Best estimates and judgment of men in the frozen food business would add 50% to the figure, making the kwh. per pound .326. Say 1/3 of a kwh., and this is on the conservative side.

The idea of arriving at such a figure was conceived for the obvious purpose



Rotary freezer in which Dainty Mix brand melon balls are being quick frozen in cans. Cans pass through alcohol at 35° below zero in continuous process. Machine is first to be commercially operated, opens large potential field

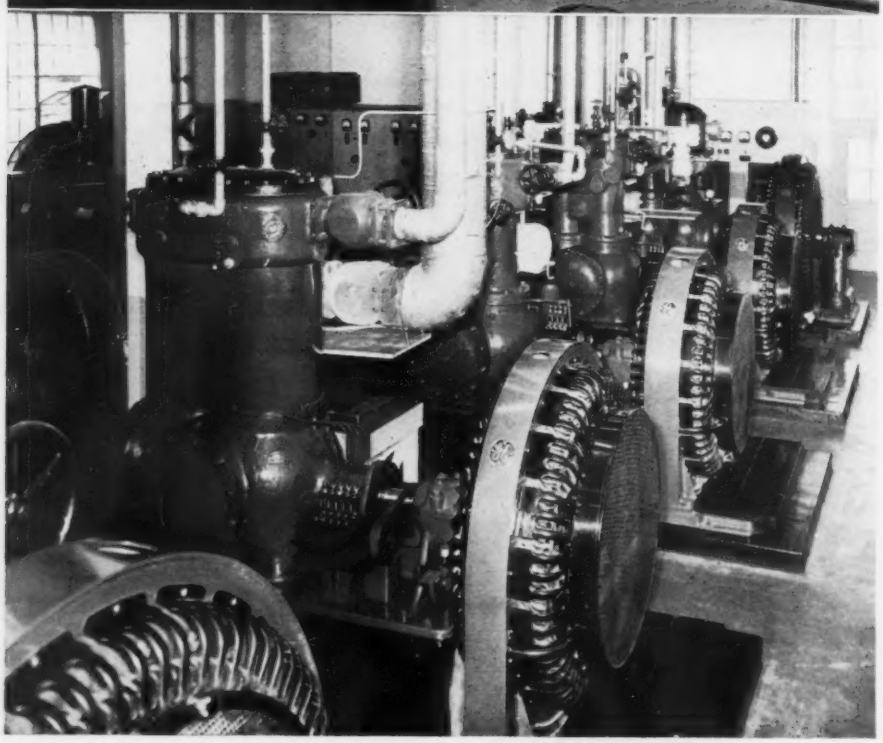
Frozen Food locker plants are now well organized and equipped to serve the public as is shown in these views



of being able to show the electrical industry what a big stake it has in this newest method of food processing. The next step was to determine volume. For this, McGraw-Hill's magazine, *Food Industries*, was taken as authority for fruit and vegetable production figures. Figures are obtainable for only Washington, Oregon and California here in the West. In 1946, frozen foods in the three states reached the amazing estimated total of 600,000,000 lb. This includes fruits, vegetables and fish. Poultry and meat figures were not obtainable.

Storage battery lift truck placing trays of packaged food in quick-freeze tunnel (left) at Modesto Refrigerating Co.

Freezing is by air blast at 35° below zero. After quick freezing, products are held at zero to —5° storage (right)



Poultry is now being quick frozen in large tonnage, yet the surface has only been scratched. Quick frozen meats are beginning to appear on the market. Poultry and meat processed by quick freezing easily can soon exceed the tonnage of all other foodstuffs combined. Fish, also, will greatly increase in tonnage. By 1950, the probabilities are that tonnage of all quick frozen foods in the three Pacific Coast states will reach 1½ billion pounds.

Even so, take the 600,000,000 lb. 1946 figure, and we have an electrical energy consumption at present, at 1/3 kwh. per pound, of 200,000,000 kwh. This would keep a 22,800-kw. power plant operating continuously at 100% load factory.

This is big business for the power companies. But—utilization equipment is required wherever electrical energy is consumed. Expansion means more refrigeration, warehouses, cold storage transportation, grocers' cases and storage facilities in the home. All this means more motors, more wiring and more appliances. Truly, it is a tremendously important new field for the electrical industry.

Future Status of Frozen Foods

We have witnessed the rapid growth of the frozen food industry during the past ten to fifteen years. Few in the electrical industry have attached to it the significance here developed. And yet, the industry is only in its infancy. Fruits and a few vegetables were first to come under quick freeze preservation. Certain fruits and vegetables were particularly well adapted to the process. Experience and research have now taught the industry how to preserve most all of the common fruits and vegetables, however. It was learned, for instance, that flavor, texture and appearance depend largely upon environmental temperatures all along the line. Also, new techniques are being employed.

Refrigerated trucks (top) lined up at frozen food distribution warehouse of Frozen Food Distributors Inc., Oakland, Calif. Motor-driven refrigeration machinery on trucks is operated at night from plug-in outlets to refrigerate for next day's grocery delivery route. Center, charging room for storage battery lift trucks used in handling frozen food pallets. Gasoline-engine-driven trucks cannot be used on account of food contamination. Bottom, large synchronous motor-driven compressors supply refrigeration for one of scores of quick freezing and cold storage plants on West Coast. Plant uses 20,000 kwh. a day, 100% load factor

Frozen fish (above) are stacked in Columbia River Packers' Assn. cold storage plant at Astoria, Ore. Center, slicing salmon into steaks. Each steak is cellophane-wrapped and ready for the frying pan when thawed out. Below, filets are being frozen in 10-lb blocks for bulk users. Tonnage of fish preserved by quick freezing is growing annually, as is shown by the records

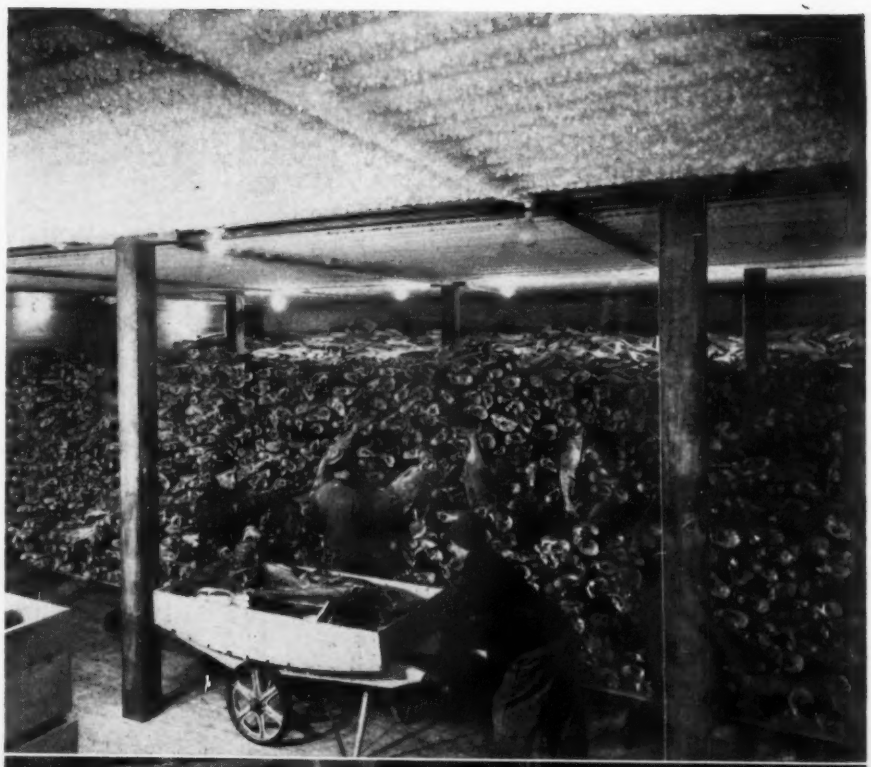
Most significant of these is the freezing of foodstuffs in cans. This opens up a whole new field of almost unlimited possibilities. In the plant of the Dainty Mix brand at Modesto, Calif., there is in operation this year for the first time an alcohol rotary continuous freezer for canned goods. For the first time it is now possible to preserve satisfactorily such things as melons. At the time the accompanying photograph of this machine was taken, the run was all Crenshaw melons and Honey Dew melon balls. Only by quick freezing in a can will such watery foodstuffs as melons stand up. This is the beginning in things that can better be quick frozen in cans rather than in the conventional paper carton.

Following the melon run, the producer's brand of fruits for salad was to be frozen in cans. This contains pears, pineapple, peaches and grapes principally. Part of this year's pack will be heat processed in cans in the conventional manner and part will be quick frozen in cans to preserve the fresh fruit characteristics and flavor of the product. Other canners also are installing refrigeration for quick freezing.

Plants for quick freezing of chicken and turkey are springing up rapidly. Quick freezing of poultry bids fair largely to displace the fresh market. This means a better product to the consumer and also much to the producer. Now the year around market can be stabilized because chickens and turkeys can be processed at peak-season supply and distributed throughout the year as market conditions warrant. It means that instead of glutting the market seasonally and demoralizing prices, the supply can be spread out over the year.

The same thing exactly is expected to take place in the meat industry. Properly frozen meats are claimed to be far superior in tenderness to fresh meat. This tremendous field is just beginning to be explored.

A large tonnage of salmon and fillets is now being frozen in the Northwest. Notably at the very modern plant of the Columbia River Packers' Assn, at Astoria, Ore., illustrated. Potentially, the preserving of fish by the quick freeze process is tremendous.



Channels through which quick frozen foods pass to reach the consumer are well developed. The accompanying flow diagram gives this distribution picture. All of the accompanying photographs show some stage in the line of distribution. This frozen food business is highly organized.

Starting with the frozen food locker plants many years ago, this branch of supply had reached good proportions when the large commercial freezing plants started an entirely new line of supply and distribution. Although still increasing in number and more popular than ever, the frozen food locker plant has largely been by-passed in the mass market by commercial handling. Food lockers are most popular in rural communities where consumers either raise their own produce or have direct access to low-cost seasonal supply. Most city dwellers, on the other hand, hardly know what a frozen food locker looks like.

The line of distribution of frozen foods processed by the large commercial plants is well established. Rail lines and trucking companies now have transportation facilities to provide the necessary low-temperature environment for shipping.. Products go to large commercial frozen food warehouses like the one shown in Oakland. From these warehouses products flow directly to large commercial users such as bakeries and restaurants, or to the grocer's cold storage cabinet via refrigerated truck as shown. These special trucks hold food at about zero while daily delivery routes are followed. At night their mobile refrigeration equipment is put on electric service lines, much as storage battery trucks are put on charging lines at night. Incidentally, electric storage battery lift trucks are almost exclusively used in handling frozen foods because of the contamination from gas engine fumes.

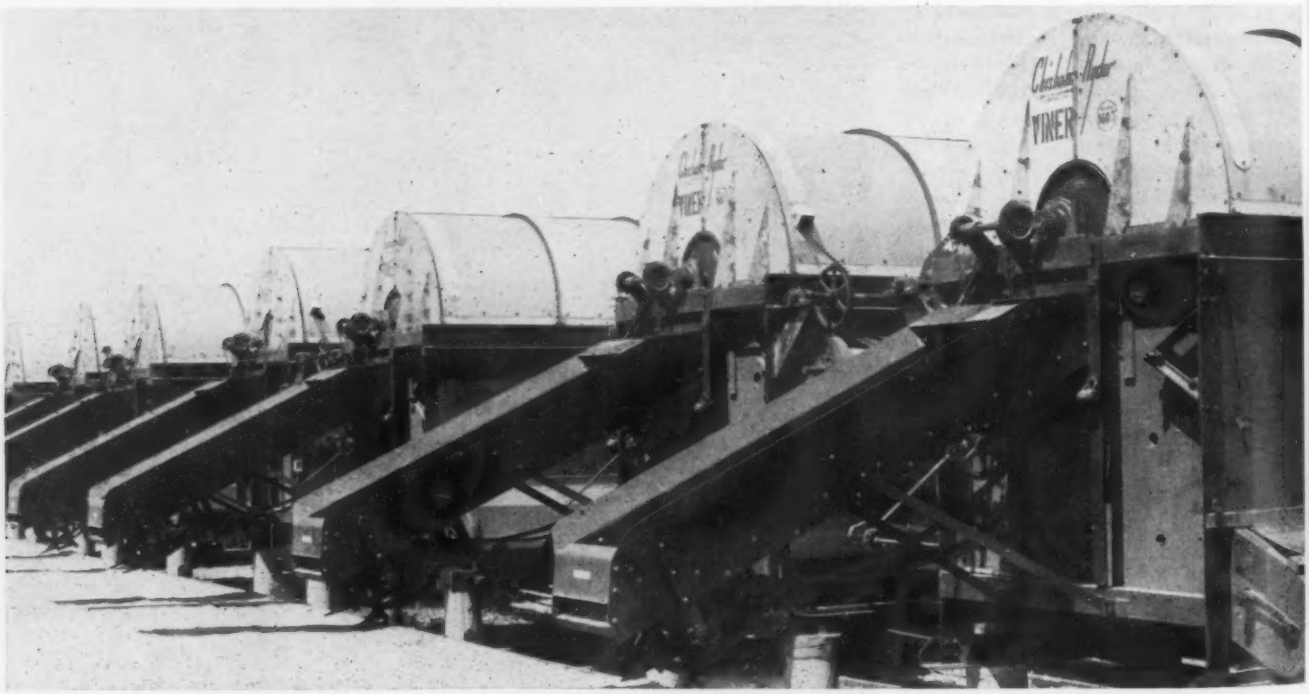
From the grocer's frozen food cabinet, and some of them are quite flossy, the householder takes the product home either for immediate use or further holding at low temperature. Several makes of home freezer cabinets are now on the market. All new domestic refrigerators are being provided with frozen food storage compartments. With appliances now available for providing storage for frozen foods in the home and the intensive promotion back of them, saturation of facilities for home storage should soon reach the saturation of domestic refrigerators.

What of the Future?

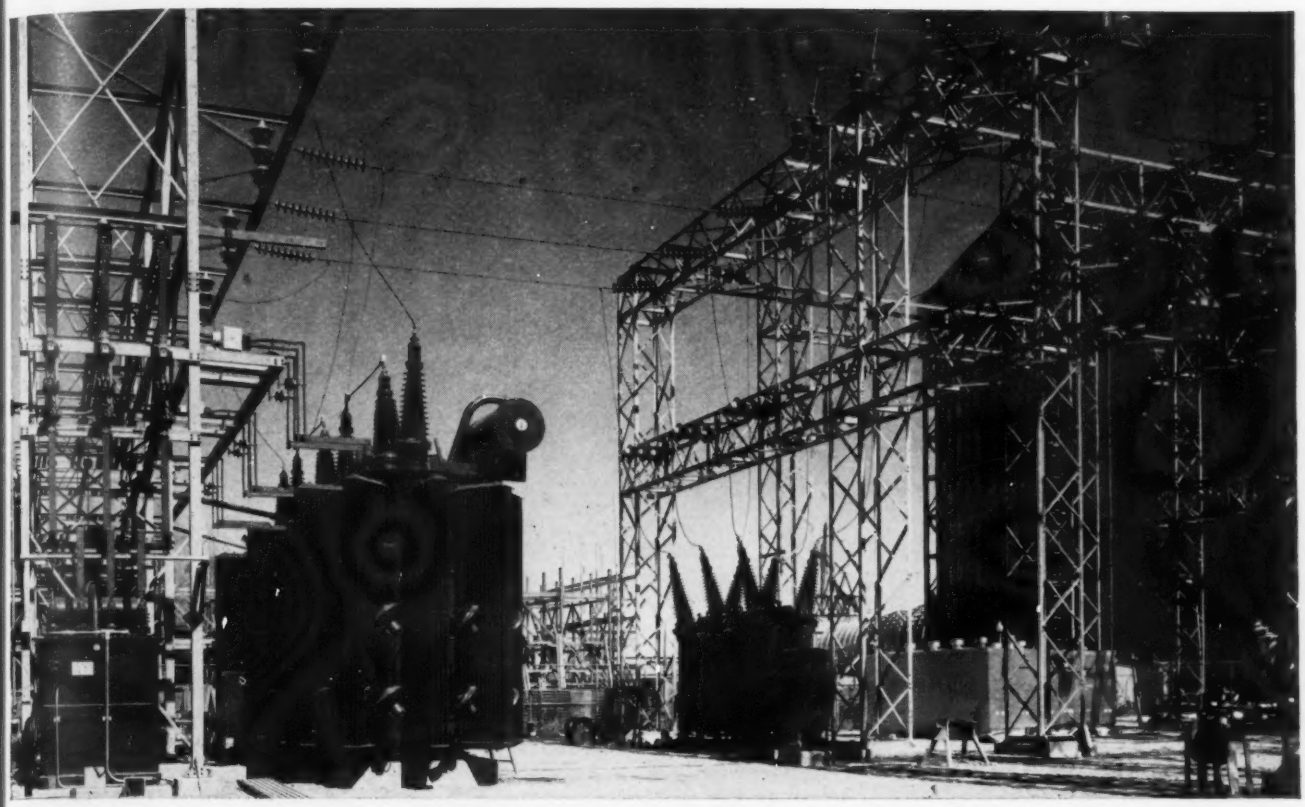
Just as there always will be a field for all modes of transportation, so will there be large consumption of fresh and conventionally canned foods. Frozen foods will displace neither, but already great inroads are being made on both. Price, quality and taste will govern, but it is evident that frozen foods are going places—and rapidly.

And of particular interest to the electrical industry is the fact that, regardless of what channel or route a pound of frozen food travels in reaching the consumers table, it has about the same energy content—1/3 of a kwh. per pound—666 kwh. per ton.

This new industry has special significance to electrical men of the West since 50% of all quick frozen foods in the nation are produced in the West. Our electrical industry can well afford to aid the frozen food industry in engineering, research and in every way. Truly, it has a big stake in every pound of frozen food consumed, and in the future of this great new industry.

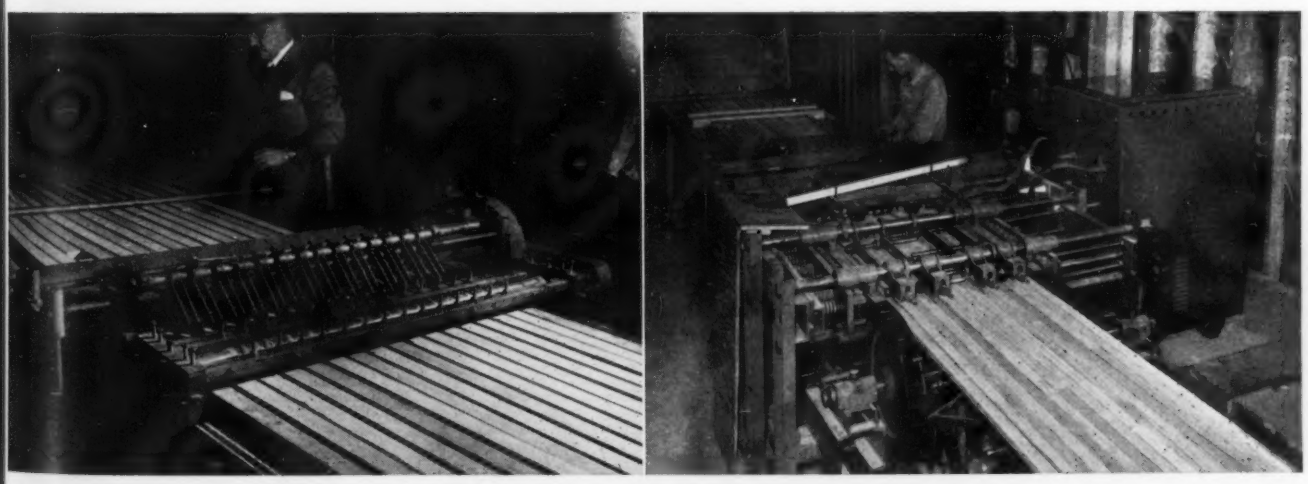


One of two rows of Chisholm-Ryder Viners at Oxnard plant of Ventura Farms Frozen Foods Inc. Lima bean vines are unloaded by gravity from side-dumping trailers onto conveyor system which carries them up into these circular shredding machines. Beans and vines are separated, beans are cleaned, weighed in bulk, blanched (sterilized to prevent spoilage, color fixed), sorted and inspected by a series of machines and conveyors which cut in half manual labor required in the plant. Beans are then packaged in metal-end wax cartons and quick frozen at —35° F. for 2½ to 3 hours before being put in shipping boxes and sent to refrigerated storage room which has 25-carload capacity. Plant was begun in March 1947 and put in operation first week of July. Although too late to handle peas this year, it is expected in August and September to process some 7,000,000 lb. of Ventura County lima beans in addition to other foods. Gross value of beans to be frozen this season will be about $2,000,000, grown mostly within 7-mile radius



More Power For Moffett Field

Drive for new 50,000-hp. supersonic wind tunnel, now under construction at Ames Aerouantical Laboratory, Moffett Field, Calif., required additional transformer capacity shown above. Bank of three units rated 110/6.6 kv., 62,500 kva. total will supply two 25,000-hp. wound rotor induction motors driving axial flow compressors in the tunnel. Wound rotor motors were selected not for speed control but from consideration of starting of large machinery with high inertia. New drive which is eighth major unit at Moffett Field will bring total connected load to well over 150,000 hp., largest single load on the system of Pacific Gas and Electric Co.

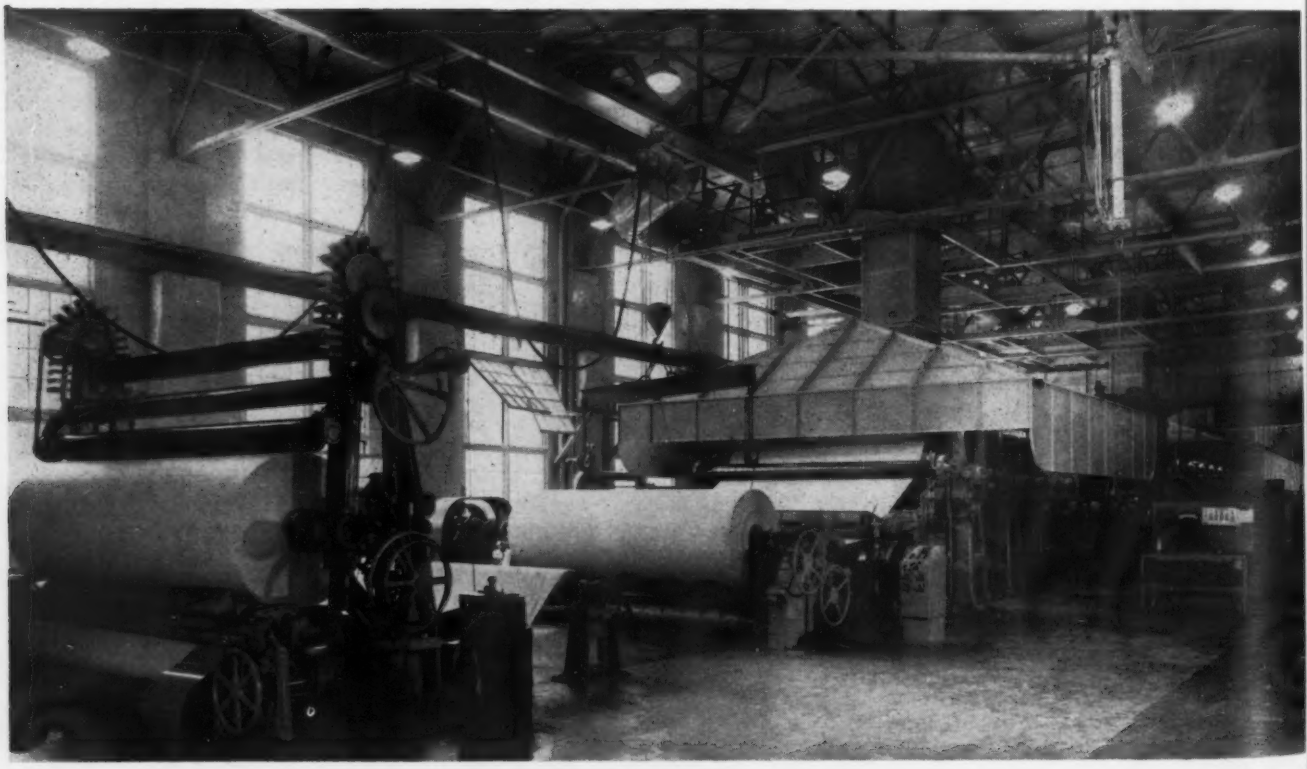


Dielectric Heat For Edge Gluing

Dielectric continuous-strip gluing converts inexpensive lumber into high-priced panels at plant of Laminated Timber Products Inc., Portland. Machine shown is one of very few using dielectric heating for edge gluing in a continuous process. 1x2-in. strips ripped from 2x4's are glued into panels up to 36 in. wide. Butt joints in individual strips are staggered, resulting in a continuous laminated panel then cross cut to desired lengths. At left is the glue spreader and at right the high-frequency machine which sets the glue at a lineal speed of 10 ft. per minute. High-frequency generator is rated 13 kw., 440 volts, single phase, 27.3 mc., 1,150 rms. volts, 2 amp. on plate. Process is one of many bringing greater efficiency and conservation to lumber industry of Pacific Northwest

Worlds Largest Crane

Largest crane in the world is nearing completion at San Francisco Naval Shipyard with plans progressing for testing in the middle of October. Structure is actually twin cranes operating on a 207-ft. high bridge-type runway, each crane to have one 225-long-ton main hoist, one 50-long-ton auxiliary hoist. Power for a-c hoist motors will be supplied by variable voltage motor-generator set on each crane, incorporating latest General Electric cross-flux control system. Tandem operation with an equalizer beam will give hoist capacity of 450 long tons at ten ft. per min. sufficient to lift turrets of our largest present-day battleships

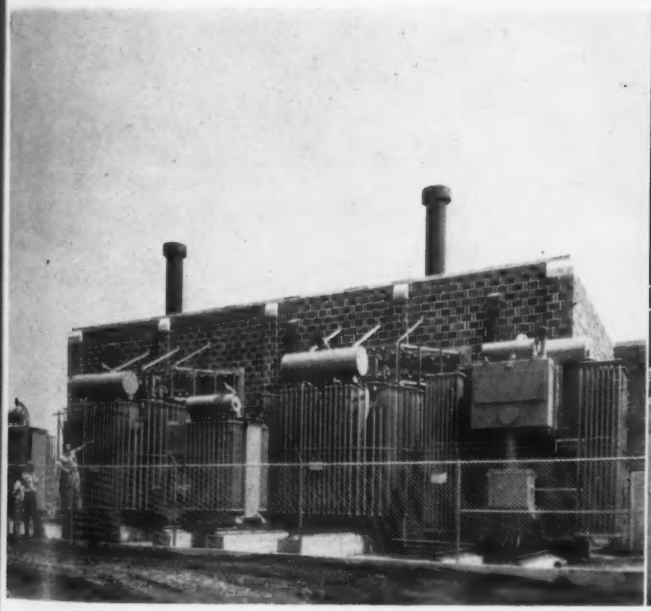


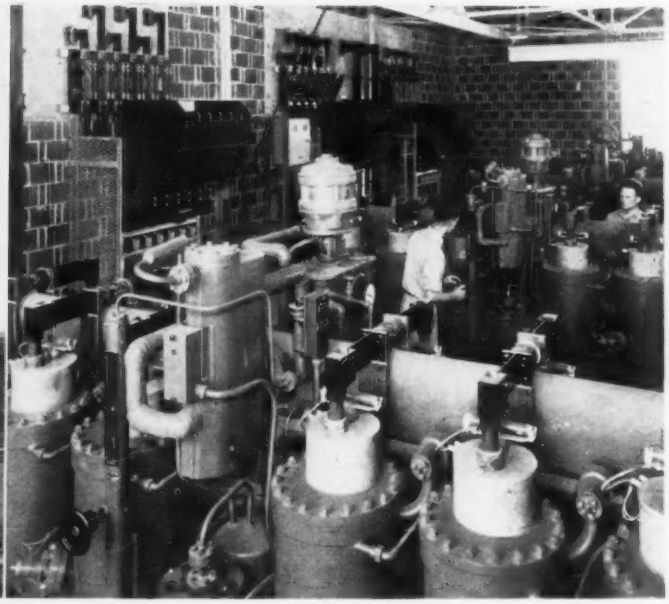
First Coated Paper on Pacific Coast

Dry end of new coated-paper machine put into operation this summer in West Linn mill of Crown Zellerbach. Entire output of 100 tons per day of this unit, which is first coated paper produced on the Pacific Coast, has been contracted for sale to publishers of Time and Life magazines. Operation of machine, which is almost entirely automatic, marks completion of first major part of current $15,000,000 expansion program of the company. Expansion includes a new substation to supply additional power for pulp grinding during low-water on the Willamette River, plant peak demand having increased from 8,000 to 26,000 kw.

Flexible Power Feature of New Building

Design of new Ordnance Building at San Francisco Naval Shipyard, Hunters Point, features installation of extremely flexible electrical distribution system throughout. Picture shows at upper left Trumbull Flex-A-Power bus coming from unit substation secondary switchgear on third-floor level to supply 3-phase power to main bay. Distribution of a-c throughout the building requires over 2,500-ft. of bus of 400-amp. rating supplied by some 750 ft. of 600- and 800-amp. main feeders. Power will be available on 12-in. centers any place along this bus simply by plugging in a circuit breaker at the desired location. Topmost horizontal line in photo is part of 440 ft. of Trumbull heavy duty "Trolley Closur" which has full load continuous rating of 200 amp. for 3-phase, 440-volt power supply to crane. Electrical design of building by Edwin W. Sharpe; installation, Brayer-Severin, Electrical Contractors



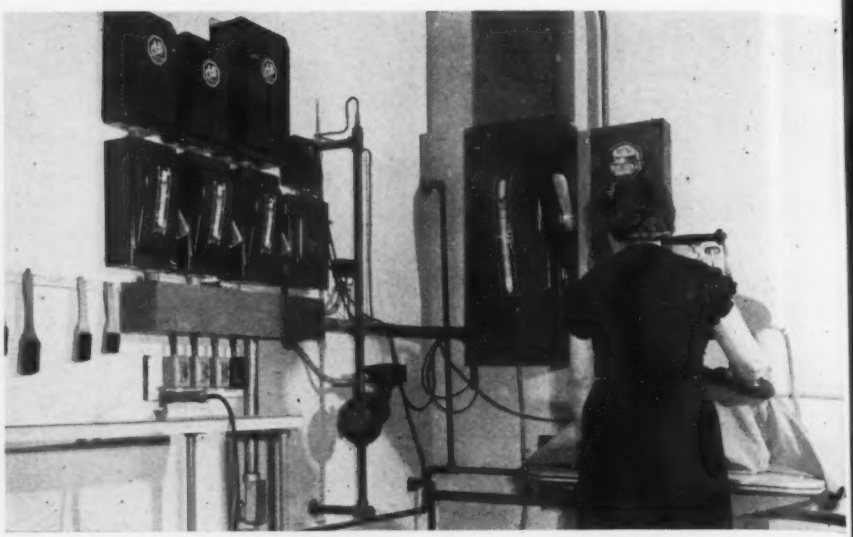


Electrolytic Chlorine At Penn Salt

Ignitron rectifiers in new plant of Penn Salt at Portland supply d-c at 365 volts for 1,200 chlorine cells. By electrolysis of salt brine chlorine gas is released at the positive pole of the cell, while hydrogen gas and caustic gas are produced at the negative pole. Chlorine gas liquefied by high pressure and low temperature is largely used to meet the growing demands of the pulp and paper industry of the Northwest. Rectifier equipment and special transformers came from Basic Magnesium at Las Vegas, Nev. This important new plant requires 7,500 kw. and is served through the facilities of the Northwestern Electric Company

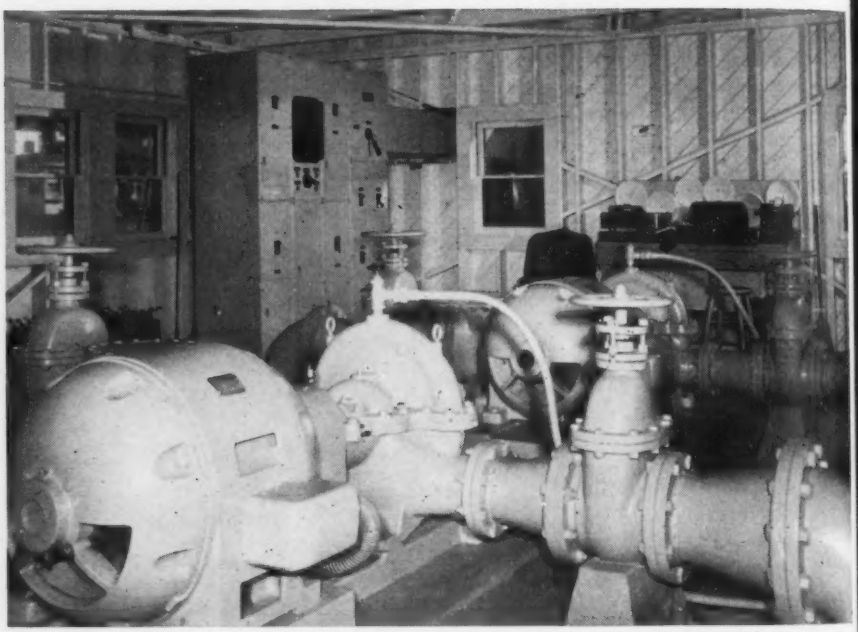
Electrical Answer to Pressing Problem

This electrically heated boiler supplies steam for cleaning and pressing establishment in Portland, Oregon. Attractive power rate of about eight mills, coupled with low cost of installation compared with a fireproof room required for a fuel-fired boiler, is responsible for growing popularity of this type of installation in the Pacific Northwest



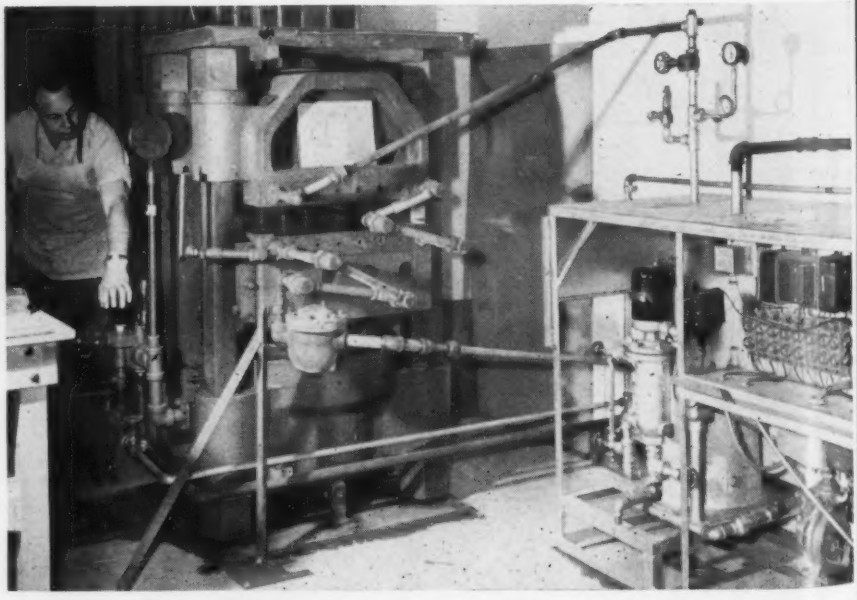
Pumps Use Off-Peak Power

Substantial savings through use of off-peak power is aim of South San Francisco's new pumping plant for domestic and industrial water. Automatic control installed in switchboard at rear for three 100-hp. main pumps provides programming of pumping cycle throughout day and night, eliminates necessity for having operators constantly in attendance. Pumps have sufficient capacity to meet maximum demand by operating all three from 10:30 p.m. to 6:30 a.m., one throughout day. Average demand is considerably less, can often be met by two pumps in off-peak period



Electrical Boiler For Press

Use of an electric-steam generator in plant of Western Paper Converting Co. of Salem, Ore., has greatly decreased spoilage in curing rubber plates or mats used in printing. Old gas-fired boiler with long steam line was unable to maintain platens of press at constant temperature of 312° F. required for proper curing or vulcanizing. "Flash"-type electric boiler made by Cronholm Mfg. Co. of Portland, Ore., is located immediately adjacent to press. It produces 100-lb. steam pressure in one minute from a cold start, and heats the great mass of metal in the press to uniform temperature in about an hour



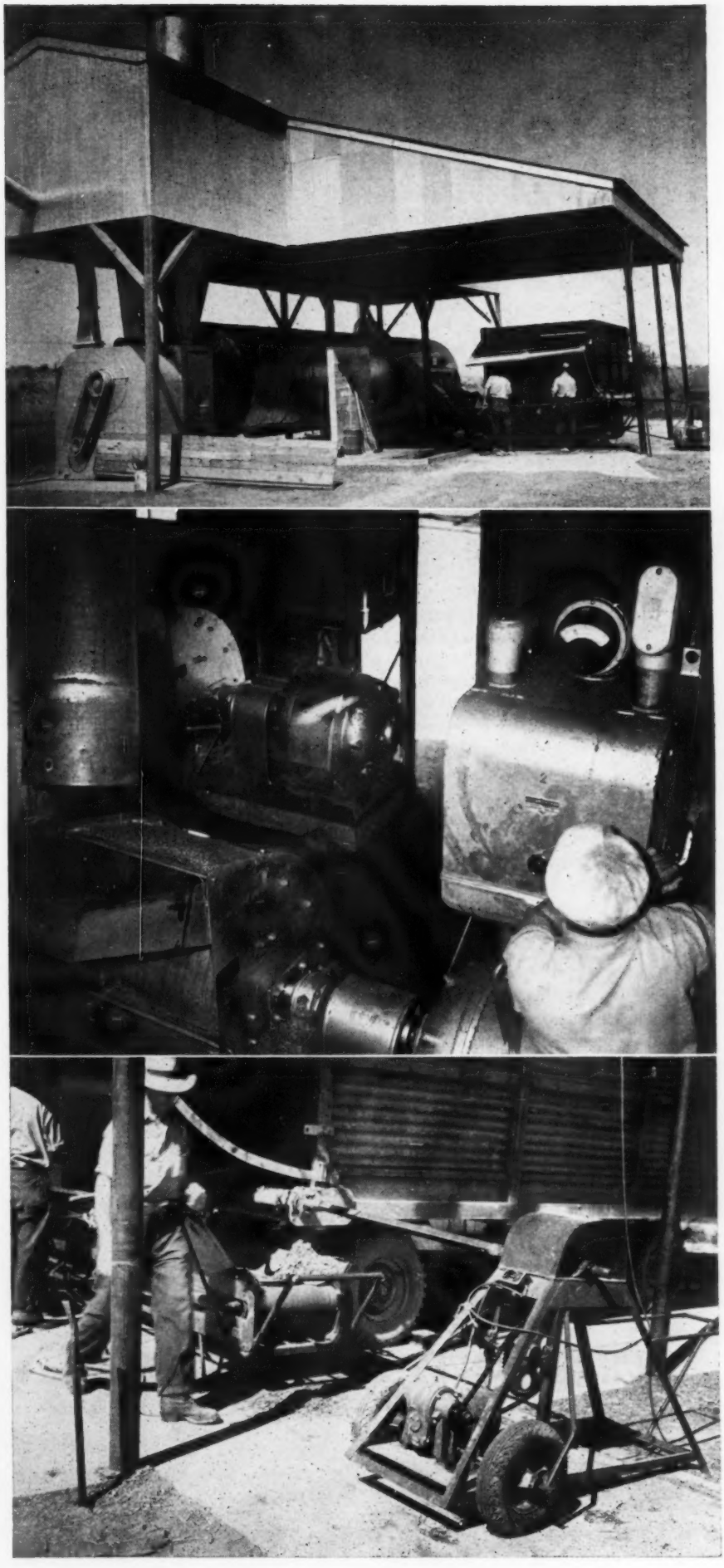
It Ain't Hay

Walla Walla alfalfa plant points new trend

WHEAT growing prairies around Walla Walla, Wash., aren't what they used to be. Something of an agricultural revolution is taking place here, especially since the river sources of water for irrigation are now being augmented by deep wells on the slopes of the hills nearby. Grain, raised by dry farming, first gave way to vegetables and orchards a few years ago. The Walla Walla Cannery started an industrial development. Now there are several canneries, a brand new Birdseye freezing plant, and Continental Can Co. has a plant there too. Sprinkler irrigation, which requires pumping, is having on water. Suppliers of sprinkler systems also add to the industrial community.

New industry in this agricultural trend is dehydration, such as the H. M. Ahlquist Dehydrator plant pictured here, which processes fresh green alfalfa quickly through a dehydrator, grinds it, sacks it for a premium poultry and livestock feed. Similar processing is now being given to the green pea vines harvested mechanically to serve the canning and frozen food industry growing there.

Ahlquist's plant is served by Pacific Power & Light at 440 volts, which he uses in two 125-hp. motors in the hammer mill. For other motors and lights this is stepped down to 220/110 volts by dry-type transformers. A 1½-hp. motor drives the unloading conveyor at the dehydrator; a 40-hp. motor the rotating drum, and a portable ¾-hp. rig helps unload the especially built trucks equipped with a conveyor belt bed. The plant sacks 1½ tons of dry meal per hour.



Truckloads of fresh cut alfalfa are brought to the dehydrator (top) and after being dried are blown to the hammer mill (center) where the powdered meal is sacked for shipment. Portable electric motor rig (bottom) turns conveyor belt floor of truck to unload alfalfa onto other conveyors

Asphalt Tanks Are Heated

226 kva. of electric heating eliminates old high-pressure, fuel-fired boiler operating in asphalt batching plant

ONE of the very few asphalt paving plants in the country to be electrically heated is the new Los Angeles city plant located on Olympic Blvd. at the Los Angeles River. Through the cooperation of H. P. Cortelyou and staff with industrial heating engineers of the Department of Water & Power, this new 160-ton plant is completely electrically heated. The installation consists of a total of 226 kva. for process heating in a specially designed system, thermostatically controlled to maintain asphalt and road oil at 325°F.

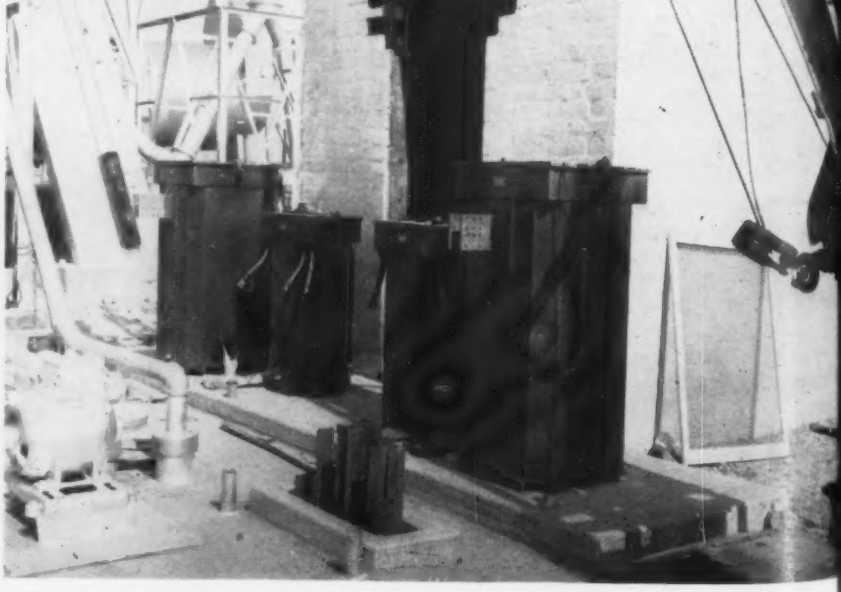
Two large reinforced concrete tanks, 35 ft. long, 13 ft. wide and 10 ft. deep, with a capacity of 110 tons each, are buried in the ground with the tank roofs level with the surface. The two tanks are equipped with six 80-ft. heating units made of ½-in. by 2-in. mild steel bar, mounted about 4 in. above the bottom of the tank floor as shown. The six heating units are paralleled through copper bus bar at the terminals of a 75-kva, single-phase 480/25-volt transformer. By means of a tap changing switch on the primary the secondary voltage on the heating grids is variable in 1-volt steps from 21 to 25.

Thermostatic controls, plus the primary tap changer on each transformer, maintain a temperature of 325°F in the asphalt and road oil tanks. A curve drawing temperature chart mounted on the switchboard enables the plant operator to keep a graphic record.

Each of the 80-ft. steel bar circuits is rated 12 kw. at 25 volts. By changing the tap switch on the primary side, the input may be dropped to approximately 8 kw. A wattage density on the heating bar of approximately two watts per square inch maintains temperature of the heating bar to within a few degrees of the desired asphalt temperature, completely eliminating charring.

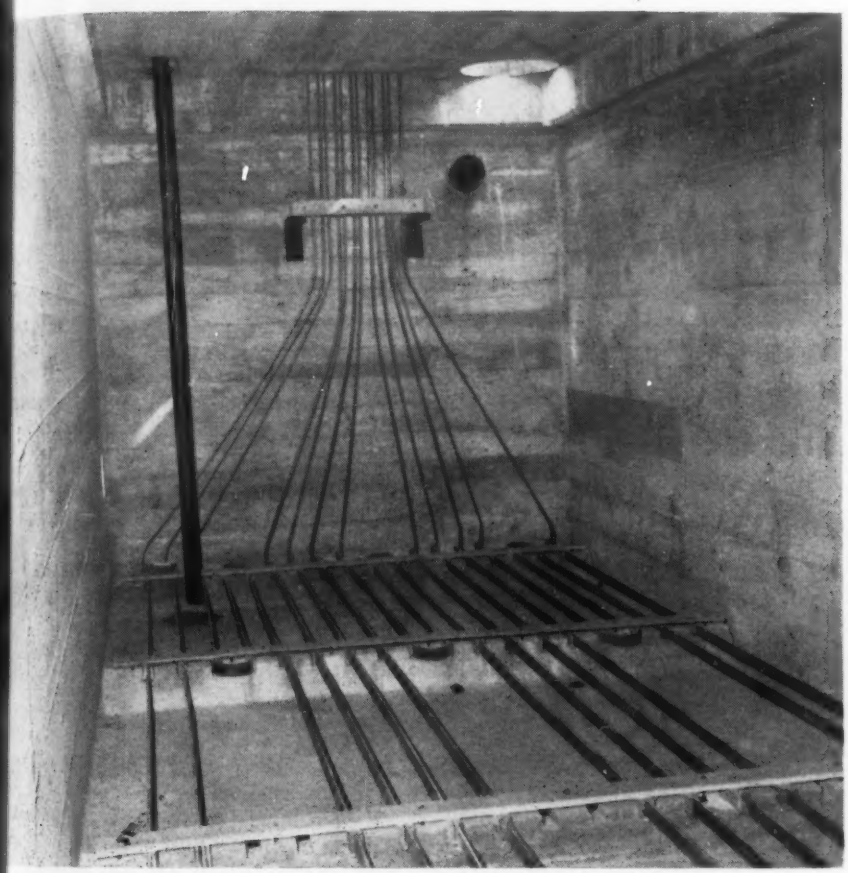
This method of maintaining temperature of the asphalt eliminates the installation of fuel-fired boiler equipment with its high first cost, its heavy maintenance cost, and its high labor cost. The automatic control made pos-

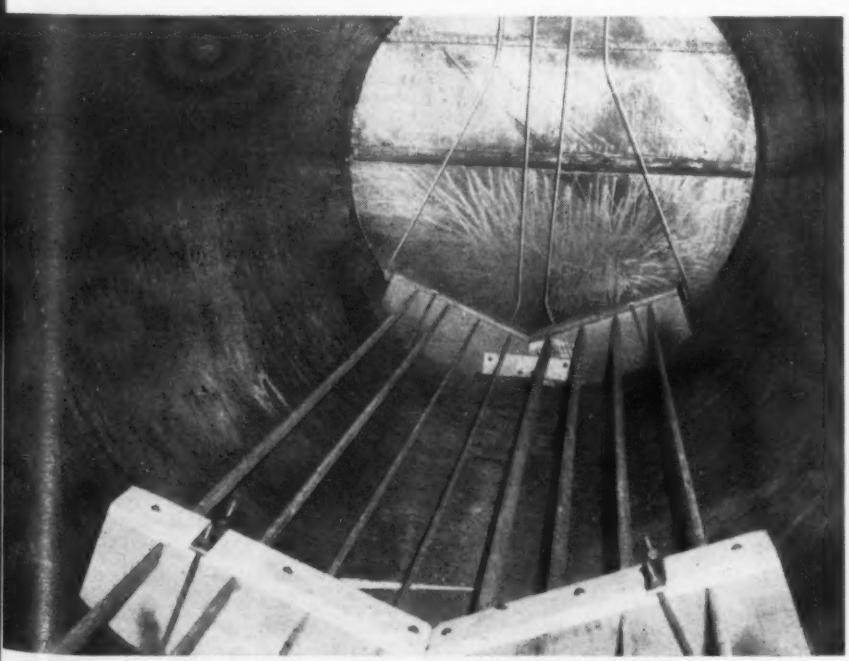
Plant has 226 kva. in electric heating to maintain 325° F. Below, heating transformer on pad between switchboard room and asphalt tank roof. Copper bus bars from heating element in tank connect to 25-volt transformer secondary. Two 75-kva. transformers supply asphalt tank heaters, two 15-kva., pipe line heater



Electrically

W. W. Pearce
Industrial Heating Engineer
Los Angeles Department of Water and Power





Heating element in concrete asphalt tank, above, consists of six circuits composed of ½ x 2-in. mild steel bars. Units are paralleled at terminal of 75 kva., 480/25-volt transformer. Below, inside view of fuel oil tank showing steel bar heaters and, at end of tank, the copper bus bars leading to the transformer on outside

sible by electric operation eliminates practically all of the maintenance cost, also the necessity of attendance and supervision. For 16 hours a day, plus Saturdays, Sundays, and holidays and those times during the rainy season when the plant is not in operation, no attendance is necessary. This has been the experience of a similar type installation at the Sparks-Mundo Asphalt plant in Los Angeles.

Pipe Heating

In addition to holding the temperature of the asphalt and road oil at the proper levels, it is also necessary to heat the piping through which the asphalt is delivered from the tanks to the weigh bucket and return. This was accomplished by making the piping a resistant circuit and supplying a potential of approximately 20 volts across each pipe circuit. Three such circuits are equipped with one 15-kva. transformer, each with tap changing switch on the primaries. This allows a variation from 12 to 24 volts on the secondary side. One of these transformers heats the asphalt pipe line, one the road oil pipe line, and the third, the fuel oil pipe line.

The third tank, used for fuel oil, and likewise buried, is also heated. This tank is 6 ft. in diameter and 19 ft. long. It is equipped with two 80-ft. steel bar circuits, supplied with energy from a 25-kva. transformer similar to the transformers heating the asphalt tanks. A 6-kw. Calrod heating unit is strapped to the weigh bucket to maintain its temperature.

Total electrical load of the plant is something over 650 hp. and is served through a 34,500-volt transformer bank, stepping down to 480 volts, which is carried through underground service to the switchboard near the asphalt tank.

Although figures on the electrical consumption are not yet available on this installation, experience at the Sparks-Mundo plant indicates that the cost of electrical energy for the process heating is less than the former cost of labor necessary for licensed firemen to maintain hot asphalt 24 hours a day. The Sparks-Mundo Co. has found electric heating to so excel steam that no consideration would ever again be given to steam boilers for this type of heating.

Presentation of the James H. McGraw Medal for Contractors to J. Walter Collins, Chicago Chapter manager, by W. T. Stuart, editor, Electrical Construction and Maintenance, New York. Mrs. Collins and NECA President Robert McChesney are seated at the head table

Views on Production were voiced by industry spokesmen John Busey, president, General Electric Supply Corp., left, and George Conover, vice-president Philadelphia Electric Co. Harry McClelland, vice-president of Ban of America, speaking, urged ways for lower-cost housing

Vacation Question Crashes NECA

HIGHEST wages and highest materials costs in history have sent electrical contractors up a dead end street. At its end they begin to see consumer refusal to buy. From all over the United States and Canada 800 or more of them came to the 46th annual meeting of the National Electrical Contractors Assn. in San Francisco, Sept. 5-11, to make an estimate of the problems and come up with some bids at solving it. All the bids were high.

"Production Problems" were the theme of the convention. President Robert W. McChesney, Washington, D. C., keynoted on this topic. The program of the convention was wrapped around the same idea. Speakers from manufacturers, utilities, wholesalers, labor, business, the public and the code all explored what might be done by boosting productiveness to offset the high wages, benefits, materials costs and taxes that add up to high construction costs. Despite a program carefully engineered to stay on this hypothetical level, some of the rough house realities kept crashing the gate and the convention ended sounding more like an electrical contractors association and less a union auxiliary.

For the sake of brevity, rather than summarize each talk or paper, this report will tell what was done or said on each contractors' problem. The circuit of each will be picked up at each outlet in the convention to give the over-all accomplishment, if any, toward the solution.

Vacations with Pay

Hot potato that nobody wanted to hold in hand, but kept tossing to somebody else, was the "vacation with pay" demand which union locals have been making as new labor agreements are negotiated. Having been maneuvered into such a contract clause the Northern California Chapter members warned others that, with this wedge, they would be pried open too unless NECA did more than pass the potato back to local determination. This realization stirred the convention to demand of its labor relations committee, a firm policy in opposition to such vacation clauses.

The high wage rate of electrical workers, it was declared, has always been justified on the possibility of intermittent employment which permits the electrician vacation between jobs. At least, if steadily employed, he receives more than others in order to finance his own vacation. Vacation time out, it was held, might cripple some projects where time limit penalties for finishing the job would be invoked, to add still more to the already high cost of labor.

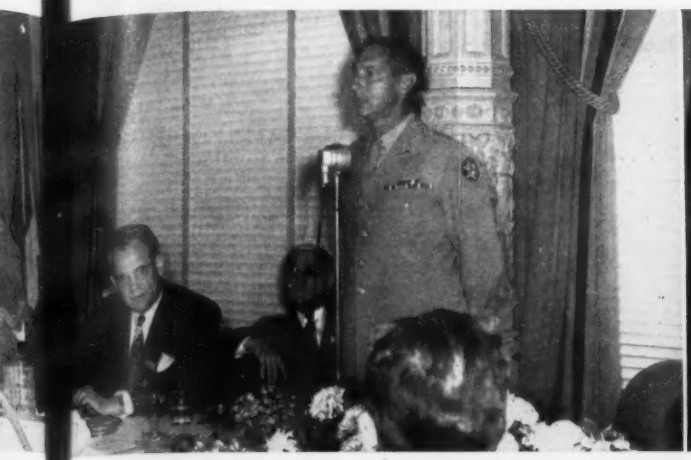
There was no good shushing this hot subject, despite appearances that it was an uncomfortable one. The convention unanimously voted to instruct its labor relations committee to declare a policy opposed to vacation plans. This all happened during the final and usually dull closing moments of the convention when resolutions and adjournment are seldom so interrupted by a burst of revolt.

Pension Plan

Resolutions from several chapters urging withdrawing from the pension benefit program with International Brotherhood of Electrical Workers went into the closed sessions of the Board of Governors and emerged as a babe in three cornered pants that ought to be given a chance to grow and show what it could do, rather than be abandoned on the doorstep. Strongest reason given the convention for staying with the plan was that if NECA quit, IBEW might sign up with general contractors.

After speaking for President Dan Tracy of IBEW, J. Scott Milne, new international secretary, made no bones that his union would furnish no men to those who did not pay into the pension fund.

Laurence W. Davis, now secretary of the National Employees Benefit Agreement, reported statistically on the program. There have been 56 joint local boards set up to collect for the fund. Total collections have increased each



eneral Mark Clark, in simple, eloquent tribute to his oops, who four years before landed at Salerno. His ddress featured a testimonial dinner given to J. Scott ilne, left, recently advanced to International secretary the IBEW. Clyde Chamblin, center, was dinner chairman. Above, at right, West Coast Westinghouse vice-president, Robert A. Neal, giving the manufacturer's slant on production problems. T. L. Rosenberg, Oakland, Division 6 vice-president of NECA, at the extreme right, was chairman of that session of the convention

CA Convention

onth; were $52,000 in July; eventu-lly will be $250,000 a month. It will ke $3,000,000 a year as the contrac-rs' dollar-for-dollar match of union ssessments of members to pension the ,000 maximum number expected to e on pension. Now the list of pension-rs totals 2,777; increases about 400 a ear.

roduction—Opinions on It

"We can carry our high employment nd high wages only if we can make e price attractive to the purchaser," id McChesney in his presidential key-ote address. "We know the business there. The backlog is immense. But acklog and potential business mean othing unless the buyer is willing. We ust all work to make the price one hich will attract the buyer, being con-nt, if necessary, with a lower ratio of rofits and possibly a lower wage un-ss means can be found to make that age pay its way productivewise." He arned that a sharp drop in exports ight put some of the present-day ex-ansion plans back on the shelves.

McChesney charged the escalator ause and uncertainty of delivery dates r materials with unnecessary added ost. All he asked was that a manufac-rer or distributor hold to a quoted ice on a given quantity of a product r a given job. This would eliminate e need for a whole range of contin-gency fees. Definite delivery would prevent idling of manpower and losses due to waiting. He asked labor to appreciate its share of responsibility; to make high production commensurate with high wages. He put upon contractors the challenge to become the best salesmen the distributor has in order to remove the need for them to sell direct to the contractors' customers. Taxes that take from both management and labor the incentive to work, need to be revised, he said. Taxes must come out of prices — the higher the taxes the higher the prices to the building public.

Speaking instead of ex-Westerner E. O. Shreve, president of the U. S. Chamber of Commerce, Dunlap C. Clark, president, Central Bank of Oakland, a director of the U. S. C. of C., expressed the ideas of business management on productivity. Terming productivity not a matter of "speed-up" but of joint effort of both employer and employees, Clark said the greatest danger today is a spiraling of wages and prices to a point where consumer resistance will bring a stop and a crash. The trade association, he said, can aid greatly by stabilizing the economy—1. acquaint the public with the fact wages can't be raised without raising prices; 2. study with other groups ways to remove the causes of irregular production; 3. assemble statistics to aid the business.

Speaking more for the public than as a banker, Harry McClelland, vice-president, Bank of America, threw a challenge to the construction industry somehow to "devise a way of building an 'expensive' low-priced house that will answer the need of 50% or more of the people in the market for homes." Only 18% of the people can afford to pay more than $5,000 for a house, based on income. People are becoming impatient; the building industry is in danger of being told, "Shoot or give up the musket," and of having government housing forced on it.

Utility spokesman George R. Conover, vice-president, Philadelphia Electric Co., rattled off the tremendous figures of generating capacity and kilowatt-hour growth and expanded on what this spelled in business for electrical contractors. He also mentioned a new policy among utility companies to turn over to contractors a substantial portion of the utility construction and expansion work.

Manufacturers can contribute to reducing costs, said R. A. Neal, vice-president of Westinghouse Electric Corp., now of San Francisco, by improved engineering, weight reduction, better materials, improved fabrication methods, war-learned new techniques. "Once we can achieve uninterrupted flow, through labor stability and access to raw materials in sufficient quantities, I am sure the brilliant techniques of wartime production will make themselves felt." But with tremendously increased capacities to produce more cheaply, volume must be maintained to make good on these economies. Therefore the contractor must absorb and sell and install the high rate of production manufacturers are establishing.

"We don't make the material, we install it," said Charles A. Langlais, San Francisco contractor, speaking on what contractors may do to increase productivity. "If the flow of material is not constant, labor is retarded, job morale drops, costs go up. Contingency provisions cause lump-sum estimates to be high." He and his collaborators, Oliver Burnett, of Chicago and A. Herman Wilson, of Washington, D. C., rec-

ommended these practical and realist factors that can be improved to aid this difficulty: 1. Materials—Elimina escalator clauses, get steady productio and flow of materials to the contracto keep promises on deliveries and quant ties, avoid wastes due to cross-purpo distribution policy mixups. 2. Labor— Develop more manpower by more a prentice training, develop more coo erative worker attitude, remove arti cial restrictions on production, mak use of new tools and methods. 3. Ma agement—Avoid dilution of manag ment over too many jobs, train bett construction engineering personnel, d velop better trained foremen, do mo sales and business promotion.

In a contractors' forum on this su ject on Wednesday morning, at whic Langlais presided, he was asked mo details as to the foremanship meetin he had held. These meetings, he sai were held in his office, after hours, o the foreman's own time. Once starte on a mutual basis of understandin they now are enthusiastically attende At each meeting one foreman prepare and presents a brief paper on som management problem, it is discusse and copies of it given to each for stud and reference. Other contractors to of similar foremen's and journeymen meetings, particularly Norman Ferg son, California Electrical Works, S Diego, which has a 12-week course.

Wholesaler distribution costs, Jo L. Busey, former Westerner, now pre dent of General Electric Supply Cor pointed out, depend on how much ser

Among the Western contractors a tending the convention a few are pi tured here. Top: San Diego Chapt group, with Norman Ferguson, To Heinz, Oscar Lundberg, and IBE local manager, M. L. Ratcliff; Seatt group, next, with Larry Gattavar Ralph Lane, Frank Holert, Russ Hor ing, Lennart, Lindberg, Al Meneghi and Grover Burke; Salt Lake City grou with IBEW officials, George Howart chapter manager, W. C. Wright, Poc tello, IBEW vice-president, N. W. For berg, A. N. Sisan, J. Scott Milne, IBE secretary, and Glen Staker, chapt president; Northern California Cha ter group, with A. S. Henderson, Fresn Arthur Souza, San Leandro, V. D. Davi Coalinga, Ernest Kramm, assistant ma ager, W. S. Bassett, Oakland, B. Solomon, San Leandro and Ed Buttne chapter governor, of Oakland. Botto some of the San Francisco Chapt convention committee responsible f arrangements and hospitality, Ed Dow treasurer, Ed Conroy, convention ge eral chairman, W. J. Varley, executi secretary, Noble Wright, golf an W. B. Baker, hospitality in gener

e is expected of the distributor. Attempts to eliminate the middleman nly result in shifting somewhere else he cost of providing the services he enders. The answer to lower distribution costs, he showed, was to increase he flow of goods by more intensive elling to derive the benefits of mass roduction and that unit costs may be educed.

J. Scott Milne, former vice-president f IBEW for District 9, with headquarers in San Francisco, and now international secretary, presented IBEW resident Dan Tracy's views on productivity. "Without production," he aid, "we can do nothing. If we do not roduce, we cannot divide and share." e said the Taft-Hartley act has not reated an atmosphere in which labor nd management can work together on he all-important problem of productivity because it assumes that labor and anagement are permanent enemies. e said he had asked for facts rather han mere complaints about decreased abor efficiency and none had been supplied. The wartime cost-plus method f operating had caused considerable eatherbedding. A scarcity economy, he aid, brought an unconscious effort on he part of working men to preserve eir jobs in the face of economic rces for which they are in no way esponsible. He advocated definite eps: 1. All work for full employment conomy; 2. A joint committee to surey the facts; 3. With these facts, a oint educational program by management and labor; 4. Labor be given a efinite assurance of a fair share in the ains of production.

Less kinds and varieties of standard iring devices would contribute the ost practical economies to wiring ost, declared George Andrae, Milwauee contractor, chairman of the technical and research committee of NECA nd its member on the National Electrical Code committee. The war and he last edition of the code, Andrae aid, have made contributions to economy by elimination of superfluous wire arieties by standardizing wire, conuit switch and fuse ratings, by calling or horsepower rated switches only on otor installations and by better deining of hazardous locations. But uch more could be done by standardzation which would stop wastes of maerials and manpower by eliminating e making, stocking, selling of superuous slow-moving varieties. He urged ecifically the elimination of black onduit, low power factor ballasts, simlifying of outlet boxes, service witches, metering devices, providing a ew non-leaded wire for use where gas nd oil vapors or moisture are present, nd making up bus duct assemblies in stock sizes for high amperage services and distribution. He also urged that the contractor quit talking to customers in terms of wire sizes and talk in results wanted.

Interdependence

"But look—" N. J. MacDonald, Thomas & Betts, president and chairman of the NEMA Interdependence Committee, kept saying as he showed how every member of the entire electrical industry is dependent upon every other member. They all have one problem, "How are we going to increase the use of electricity?" Citing the big promotion programs of other industries he showed that every time a substitute for an electrical device is used (a fuel-type range instead of an electric) everyone in the electrical industry shares in losing money. He described what his own company is doing to make every employee realize that more electrical usage means job opportunity and security for them. He urged that every person get into the electrical interdependence program.

Prime example of the spirit of fellowship which exists between the electrical workers and employers was the unusual testimonial dinner given Monday evening of the convention to J. Scott Milne. It was a family sendoff given by the San Francisco Electrical Contractors Assn. and local union No. 6. Clyde L. Chamblin, contractor, past president of NECA, presided; General Mark Clark was the speaker. He told simply but intensely of the events leading up and subsequent to the landing at Casablanca and on Italy, as his tribute to those who had made the attack at Salerno beach.

Chamblin recalled the theme of his administration, 20 years ago, as "A friendly, united industry." C. B. Kenney, retired contractor, presented Milne with a gift of luggage, and in turn was given a barometer by Milne on behalf of the group. Milne, in responding, explained that when he entered IBEW work he had dedicated his life to it and where it called him he would go. He asked his friends among electrical workers and contractors never to allow his head size to increase or his feet to leave the ground.

Labor Contracts

The contract wherein the contractor is asked to furnish labor only and in some cases only supervision, was taken to pieces in more ways than mere oratory. J. Walter Collins, manager of the Chicago association, tore it to pieces statistically and by factual analysis. For his masterful breakdown of this type of business he was later given the James H. McGraw Award for Electrical Contractors, the presentation being made at the final banquet by W. T. Stuart, editor, *Electrical Construction and Maintenance*, J. D. O'Connor, Lupen & Hawley, Sacramento, added that the fee contract led to the eventual elimination of the electrical contractor.

At a special evening meeting of the Line Construction Section of NECA, the REA was told why electrical contractors were not interested in even bidding on REA work, since it is done either on force account or labor-only contract. J. K. O'Shaughnessy, chief, engineering division, REA, Washington, explained why REA had gone to such methods. Costs were so high and in the past materials could be obtained better by REA than by contractors. He said REA hoped to correct the criticisms made against it and return to lump sum contracts. R. B. Lane, president of the Northwest chapter, Seattle, told of the area agreement for linemen that had been negotiated for Washington, Oregon and Idaho.

Hospitality

San Francisco outdid itself to provide entertainment for the visitors, and Vice-President T. L. Rosenberg's chapter, in Oakland assisted in many ways too. General convention chairman Ed Conroy, Weber & Conroy, San Francisco, and Wm. J. Varley, executive secretary of the committee and of San Francisco chapter, were paid high tribute for the thoughtful preparations made by all convention committees for the affair. The Electrical Industry Depository also entertained the Board of Governors at a Bal Tabarin party. In every respect it was said to be the largest convention in NECA history.

Vancouver Officers

L. G. Sewell, of Sewell Electric Co., Vancouver, was elected president of the Vancouver Electrical Assn., the electrical contractors organization in British Columbia, at the recent annual meeting, succeeding R. Beaumont. B. Hutchison, Universal Electric, was elected vice-president; J. S. Homersham, re-elected secretary and R. Sutherland, treasurer. R. Hall, recording secretary and manager of Electrical Service League of B.C., was also re-elected. Speakers at the annual meeting were Douglas Roberston, Canadian General Electric district manager; H. L. Taylor, provincial electrical inspector and president of the inspectors association, and Harold N. Walters, general sales manager of B.C. Electric Railway Co.

GO ALL-ELECTRIC PLAN ENDORSED BY RMEL

AN INTENSIVE sales promoti plan under the industry's All-Electric Program was e thusiastically approved by the Roc Mountain Electrical League at its a nual convention held in Casper, Wy Sept. 4-6. Dealer, distributor, man facturer, municipal utility and priva power company members agreed underwrite a five-year plan, the fi year of which will cost approximate $30,000. G. B. Buck said, "we digest that part of the national Go All-Ele tric Program adaptable to our territo and have formulated a program th will give the league an inspiration a a new objective." Much of the prom tional material used will be that p pared by NEMA, but in addition advertising agency will be retained prepare newspaper ads, radio scri and other promotional material. B sides direct mailing, media used w include a farm paper of wide circu tion, local newspapers, a large netwo radio station in Denver and a numb of small-town radio stations.

A resounding slap was given n tionalism by George M. Gadsby, pre dent, Utah Power & Light Co. T State Department has said that t height of American culture is rep sented by TVA. We want a USA, n a USSA, a Union of Socialized Sov Authorities, declared Gadsby. It see strange, he said, for the president ask for 25 million to de-commun the government when 33 *billion* w spent to communize America.

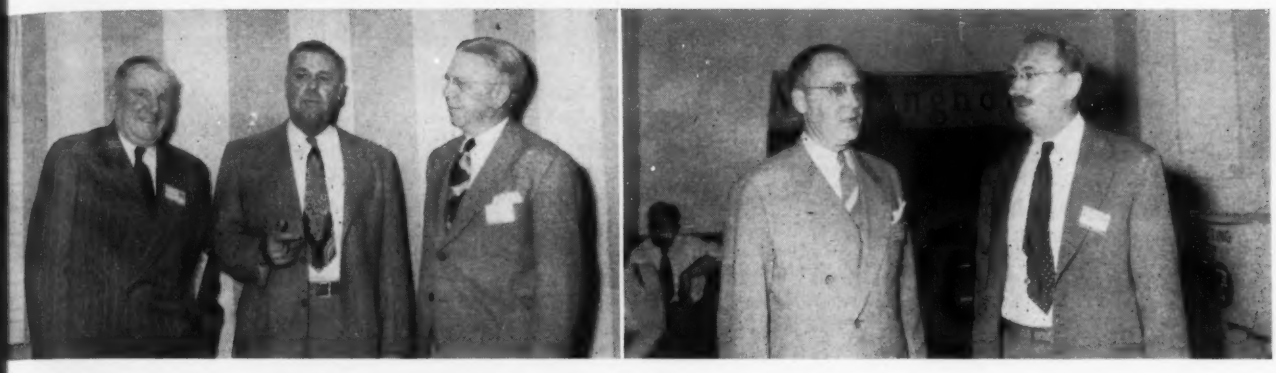
He warned against the 7-Valley A thority program to nationalize t country and highlighted provisio contained in the recently introduc S.B. 1647 Columbia Valley Author bill. Under this measure all priv power and all water rights could taken over; land could be divided into as small parcels as the author decreed, and the owner paid for t excess at the authority's own pri This would be statism with a v gence, he declared.

"Don't take for granted what h happened in England could not p sibly happen in America. It can ha pen if politicians infected with soci ism or crypto-communism virus a not challenged at every step. Wa England! Use every opportunity driving home to the American pub the faults, failures and damaging fects of nationalism. Make it an i portant part of your educational ca paign. An informed public will p vent USSA and perpetuate USA," co cluded Gadsby.

We have been too factual and te

R. E. Brookover and L. B. Bundy w chart explaining Go All-Electric p

Lenhart Johnston Kissick Buck Breslin Storey



Bullock French Gadsby Bell Powell

cal in our promotion said Ash Reddy ilowatt Collins. Instead, we must ckage and dramatize our story as r competition is doing if we expect compete in the mass market. We ve a big advantage in our industry, said, because every appliance we l is either comfort giving or labor ving, and that can't be said of in- stries that have luxury items to sell. r selling job can only be done rough awakened intensive promotion d advertising. "The Mint is the only ace money is made without adver- sing," he declared. We must sell up dollar value and not down to penny eapness, said Ash. "Each item is an- her entering wedge in the Go All- ectric Program. We must dramatize is grand story of ours for the mass arket and particularly for the youth ho are coming of age at the rate three million a year."

We are in a new and fast-moving arket said James A. Bell, Electro- aster Inc., which calls for more in- nious and smarter selling than ever fore—clever promotion and clever vertising. We are building a lot of erchandise, he said, and as soon as e sheet steel situation improves, in rhaps six months, we will build a t more and supply will quickly catch with demand. Then we will have to d out how good our salesmen are. recent survey showed a glaring de- iency in salesmen. Mental processes have slowed up and we have lost our keenness. We need intensive sales training, he said. "The future is as bright as ever. We need every ounce of energy and all the ingenuity we possess—the time has come when we must intelligently go to work if we expect to put over the Go All-Electric Program!

Improving brightness pattern and use of color offer greatest opportunities in the lighting field said G. B. Buck, II, Nela Park. He pointed out that mere foot-candle intensity is no longer the criterion by which to judge value of lighting. It is the brightness factor or pattern that governs how high we can go in intensity in the future. We made an increase of ten fold during the past 25 years and we are now up to 100 foot-candles. During the next ten to fifteen years he expects to see as great an increase made—that from 100 foot-candles to 1,000 foot-candles. In his demonstration talk Buck showed some of the new tools and new technology by which the lighting industry can improve brightness pattern and capitalize on the use of color. "It is only a matter of economics how far we can go in lighting," he said.

C. A. Powell, assistant to the president, Westinghouse Electric Corp., does not expect atomic power to displace coal during the next 30 generations or 1,000 years. Our oil is rapidly being depleted, he said, but we still have tremendous coal resources. He predicts that the liquification process for coal being commercially advanced in the Pittsburgh area will be the probable solution to lowering cost of transporting and utilizing the heat energy of coal in the future.

Rural Electrification

Power and modern conveniences will keep youth down on the farm, said O. J. Trenary, Colorado A & M College. This was shown by a recent survey in which 50% of youths on farms gave these factors as most important if they were to remain on the farm. Utilities have a large stake in rural development, he said. The farmer must produce to minimize losses even if the market is low. He must hire labor and he needs labor-saving devices to keep down unit costs. The farmer has little conception of uses and value and he needs help. He needs a well-planned wiring system. It must be adequate, safe and flexible for future loads. He needs more circuits. Two-thirds of farms do not have enough outlets. More attention should be paid to the locating of transformer poles and the meter. New buildings should have wiring layouts. These are a few respects in which the industry can help the farmer, said Trenary, if he is to take full advantage of all the profitable services electricity can render on the

farm. Cooperation of all interested in providing information and the training of personnel on farm are musts, he concluded.

USBR power developments in Wyoming and Colorado were discussed by R. N. Sensintaffer, assistant power engineer. He said this area offers a fine example of how private utilities have developed load and through interconnection have helped to provide a market for Reclamation power developed in conjunction with irrigation projects. Two important plants now under construction will greatly aid in meeting load growth in the region and in firming up much of present USBR power. These are the Kortes plant on the North Platt in Wyoming, with 36,000 kw., and the Estes plant of the Colorado Big-Thompson project, with 56,000 kw. Both should be completed within two years.

Under the general chairmanship of W. D. Johnston, manager for Mountain States Power Co. at Casper, the convention committee did itself proud in providing an excellent program, splendid entertainment features and sight-seeing trips, and in eliciting the hospitality of Casper business men. The comradery between private and municipal utility men; officials and engineers of the U.S. Bureau of Reclamation; manager for the gas company; the telephone company; the mayor of Casper, the town's newspapers; the local radio station; the Chamber of Commerce—all was most refreshing. It was an indication of the spirit that has enabled the electrical industry to achieve such accomplishment under free enterprise.

RMEL officers elected were: J. A. Bullock, manager Western Colorado Power Co., Montrose, Colo., president; W. D. Johnston, vp for Wyoming; H. T. Rankin, vp for Colorado; L. M. Burdick, vp representing manufacturers and distributors; Harry Adler, ass't treasurer, and Ralph B. Hubbard, manager. J. B. French, president, Black Hills Light & Power Co., Rapid City, S.D., retiring president of the Rocky Mountain league, had placed behind him a year of accomplishment, particularly the group's Go All-Electric Program.

● Arizona Refrigeration Association is now Arizona Refrigeration Contractors Association. Headquarters are in Phoenix and there are 25 members. Newly elected officers are G. W. Lance, president; Burke Patterson, vice-president; Kenneth Nash, secretary-treasurer; Harlan Diehl, sergeant-at-arms. A refrigeration code, including licensing, permits and inspections, is a very active project at present, according to reports from association members.

Quick Catch-up

Associations in the West have been busy within a past month. Following is the brief mention of their many activities.

Electric Clubs

At Sacramento had as guest speaker Howard Oliphant, Pacific Coast range and heater representative, G-E, who described the electrical industry in the U. S. as a $25,000,000,000 enterprise affecting the life of every citizen.

At *San Diego*, by request of its members, heard R. K. Collins, engineering and service division, Westinghouse Electric Corp., give the talk which was so popular at the PCEA convention, illustrating industrial power factor problems, showing the sources and evils of the low power factor, its correction and benefits to utility and user . . . heard Edmund T. Price, president of Solar Aircraft Co., speak about the future of San Diego.

East Bay Electric Club presented Frank P. Barnes, electronics department, G-E, who addressed the group on the subject, *Naturally—It's FM*, with an appropriate film to supplement it . . . had as a guest speaker one of its own members, W. H. "Bill" Parks, East Bay division manager, PG and E, Oakland, whose subject was *50 Years of Power Industry* . . . another program—two films presented by Alan Judson, sales promotion department, Westinghouse, San Francisco.

At *Salt Lake City* heard Alan E. Brockbank, vice-president of the National Association of Home Builders, talk on the problems of present-day housing.

NEWA

Mission Inn, Riverside, will be the scene of yet another electrical convention this year when the Pacific Zone, National Electrical Wholesalers Assn. will hold its fall meeting there, Nov. 13-15.

Inspectors

Annual meetings of both Northwestern Section, at Eugene, Ore., Sept. 22-25; and Southwestern at Riverside, Calif., Sept. 29 - Oct. 1 were being held too late in the month to report in this issue. See the November issue.

Panel electric heating came in for questioning at the Larkspur meeting of Northern California Chapter, International Assn. of Electrical Inspectors, Sept. 13. Finding no code requirements relative to installation, inspectors asked each other what experience they had had with various systems now being pioneered, such as low-voltage iron wire system, cast in concrete soil heating cable or nichrome wire, wall papers, conductive rubber panels, etc. George L. Beaver, apparatus engineer, General Electric Co., explained modern industrial power distribution practices.

Puget Sound Chapter held its third quarterly meeting Sept. 6, in Bellingham, Chairman Kirsop, presiding. The Seattle division of the chapter was recommended. Proposed sales control in that city would include regulations covering appliance repair shops. B. N. Sorenson and C. S. Alger reported utility problems caused by meter socket shortages. Manufacturers' representatives reported continued shortages. Makers of multibreakers were criticized for failing to change ratings to conform to the new code, with ampere ratings based on wire sizes. Failure to complete installations, and uncorrected "corrections" required by inspectors were inspectors' and contractors' headaches.

Leagues

O. G. "Tommy" Thompson, G-E Supply Corp., was recently elected president of the Bureau of Radio and Electrical Appliances, San Diego, on Sept. 1, succeeding Lou C. Wiese. Thompson has for the past two years headed the advertising and sales promotion committee of the bureau. Other officers chosen for the coming year include Robert L. Swearengin, El Cajon Supply Co., first vice-president; Archie Marsden, G-E Appliance Co., second vice-president; and Sam L. Hall, Electric Supplies Distributing Co., treasurer . . . Postponed its certified lamp campaign because of lack of sufficient stock . . . Sold out in 24 hours its entire display space for the 10th Annual Electrical & Home Appliance show, Dec. 2-7, at the Federal Bldg., Balboa Park.

Electrical Service League of British Columbia is working on a plan to establish an office in New Westminster. Providing the legal difficulties (due to municipal ownership) which have come up over this proposal can be worked out a branch office will be set up in the city hall, at New Westminster. The representative of the league there would serve both New Westminster and the Fraser Valley area.

Last year the Electrical Service League extended its activities into Victoria. An agreement between the Victoria branch and the British Columbia Power Commission has been worked out whereby S. G. Carlson, league field representative, will direct the promotion of an adequate wiring campaign in the areas served by the B. C. Power Commission.

League officials report that heavy-duty appliances being marketed now make the installation of 100-amp. switches a necessity. With an increased demand for these appliances the league stresses the need of an adequate wiring program which they plan to develop on a large scale.

"Everything Has to Be Sold" was the theme at the twelfth annual conference of the International Assn. of Electrical Leagues, to be held at the Statler Hotel in St. Louis, Oct. 8-11. A wide range of subjects was to be discussed by prominent members of industry, including Henry P. Fowler, manager, trade associations department, U. S. Chamber of Commerce; A. P. McNamee, *McCall's* magazine; Emerson R. Reichard, president, Electrical Maintenance Engineers Assn. of So. Calif. Inc.; F. E. Watts, *Farm Journal;* J. A. Morrison, managing director, Electrical Assn. of Philadelphia; and Morris I. Pickus, president, The Personnel Institute Inc. At the Oct. 8 luncheon J. G. Pyle, managing director, NEWA, was due to speak before the league members on the subject, *We Are One Industry.*

IES

REGIONAL CONFERENCES will again be held in November by the Pacific Northwest and the South Pacific Coast Regions, at Vancouver, B. C., Nov. 13-15; and Los Angeles, Nov. 19-20. Speakers will include several of those who presented papers at the New Orleans conference of IES in September. As in last year's regional conferences, one national authority from each of the major lamp companies will present several of the papers of members of his own firm. With longer conferences more time will be allowed for discussion and questions from which sometimes the most value is derived. Walter F. Potter, regional vice-president and Howard Walters, B. C. Electric, are making arrangements for the Vancouver meetings; R. E. Dahlin, Southern California Edison Co., is handling conference details for the Los Angeles meeting. No social activities are being planned for the latter, but a joint dinner with the Electrical Maintenance Engineers Assn. of Southern Calif. is planned for the night of Nov. 20.

Carlos Stone, named manager of the Intermountain Electrical Assn., Sept. 1, succeeding Arthur Reynolds, resigned

Matthew Luckiesh, director of G-E lighting research laboratory, Nela Park, Cleveland, following the IES convention, was programmed to speak at a number of IES and other engineering and professsional society meetings in the West. He presented his paper, *Footcandle Levels—threshold, recommended, optimum and ideal,* to the SOUTHERN CALIFORNIA SECTION, Sept. 22; addressed a large professional group audience at University of California, Sept. 26 on the subject, *Germicidal Ultraviolet and Its Relation to Public Health.* He was scheduled to talk to the SAN FRANCISCO ELECTRIC CLUB, Sept. 29; then to a meeting of California school officials at Sacramento, Oct. 1. In Portland a meeting is to be held with professional groups. In Seattle the WASHINGTON STATE CHAPTER, IES, and other societies will hear him Oct. 8.

OREGON CHAPTER, Sept. 10, heard Jack Dement, Fluorescent Laboratories., speak on *Luminescence in the Arts, Sciences, and Industries.* . . . ROCKY MOUNTAIN CHAPTER, Denver, heard a talk by Gaylord Buck II, G-E, Nela Park on *Color Coordination.* . . . NORTHERN CALIFORNIA SECTION visited the laboratories at University of California, Sept. 24, where Prof. Dan Finch spoke on *Testing and Rating of Motor Vehicle Lights.*

EMEA

NORTHERN CALIFORNIA ELECTRICAL MAINTENANCE ENGINEERS visited Station A steam plant of Pacific Gas and Electric Co. at their meeting on Sept. 17, in San Francisco. . . . SOUTHERN CALIFORNIA EMEA was given a live demonstration of the Pacific Telephone company's new car-to-car radio and land line telephone service. President Emerson Reichard announced that he had been asked to address the annual conference of the International Association of Electrical Leagues at St. Louis in October. W. T. Stuart, editor, *Electrical Construction & Maintenance,* New York City, spoke briefly. . . . W. T. Stuart was principal speaker at the Sept. 25 meeting of the EMEA of the COLUMBIA BASIN, Portland, discussing *The Road Ahead.*

IEA

First fall conference of the Intermountain Electrical Assn. is scheduled for Oct. 31 at the Ben Lomond Hotel, Odgen, Utah. Program and speakers had not yet been decided upon.

● CARLOS STONE replaced ARTHUR J. REYNOLDS Sept. 1 as manager of the Intermountain Electrical Assn. From 1944-46 Stone was director of sales and public relations for Provo Department of Utilities. Since the first of this year and until his recent appointment he operated his own construction business. Reynolds has taken a position with Westinghouse Electric Supply Co. as a sales representative in the Salt Lake area.

Seattle Electric Club

John P. Lawton, head of the Seattle branch, Graybar Electric Co., has been named president of the Electric Club of Washington, succeeding Tom M. Widrig, of the Trumbull Electric Mfg. Co. Lawton was elected at the statewide electrical organization's Sept. 15 meeting, held in the club's quarters in the Gowman Hotel.

Other officers named at this session included: first vice-president Claude R. Kingsbury of the Ohio Brass Co., who succeeds Lawton; second vice-president Larry Gattavara of the O. A. Carlson Electric Co., who succeeds Kingsbury. Charles W. Allison, Puget Sound Power & Light Co., who has acted as treasurer of the club for many years was re-elected, as was R. A. Church, Puget Sound Power & Light Co., secretary. New trustees are: J. C. Sroufe, Northwest Electric Co.; J. D. Gawne, Seattle City Light, and W. F. Gaunt, business manager, Local 46, IBEW.

● J. H. CLAWSON, controller and acting treasurer of Puget Sound Power & Light Co., has been re-elected a director of the Controllers Institute of America.

Hull Smith

Cone Terrell

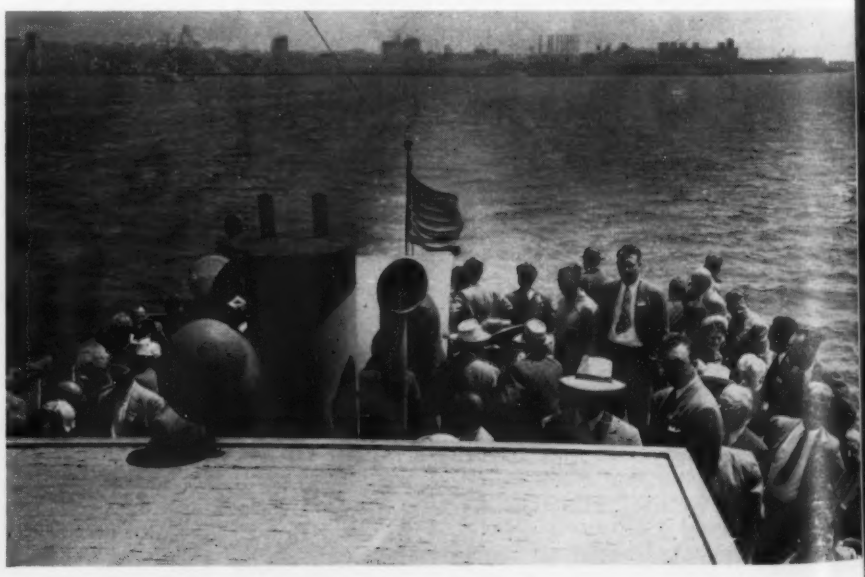
San Diego Meet Bullseye for AIEE

WITH its combination of a well-balanced technical program and splendidly arranged inspection trips and entertainment, the Pacific Coast General Meeting of the American Institute of Electrical Engineers held in San Diego Aug. 26-29 proved well worthwhile for the 585 who attended. National President Blake D. Hull, speaking at a luncheon meeting, indicated that he proposed to do something during his term of office toward formation of a national organization to represent all engineers. Prime purpose of such an organization would be to handle non-technical and welfare problems of the engineer, leaving the existing national societies their present technical activities and perogatives. Success of this plan, he feels, depends on individual memberships similar to the existing national societies. To set up such an organization President Hull recommended that the major national engineering societies immediately and without further procrastination appoint delegates to attend a meeting to draw up a constitution and by-laws. On behalf of the AIEE President Hull solicits the support of all engineering societies toward the early realization of such an organization.

Meeting was formally opened with a thorough analysis of proposed Colorado River developments by W. S. Peterson, assistant chief electrical engineer, Department of Water & Power, City of Los Angeles. In showing the need for early development of additional power on the Colorado to meet the rapid growth in the Pacific Southwest he stressed that power projects must be conservatively developed along the lines of the original Boulder project to attract Congressional support. As an example such projects as Bridge Canyon and Glen Canyon, now being discussed, cannot carry an undue amount of unfeasible irrigation, nor can they stand economically the diversion of water around them. "The Bridge Canyon project by itself and without undue support by the Hoover Dam project would be an unfeasible power project," said Peterson, "but when operated in conjunction with adequate upstream storage such as that afforded by Glen Canyon, and augmented by future power developments which such storage makes possible, the entire Colorado River development can be a successful and useful project."

Among the highlights of the technical sessions from point of view of power engineers was a well-attended symposium on distribution system modernization featuring a paper by H. E. Jung and R. C. Blankenburg, Southern California Edison Co. In a comprehensive survey of the aims and problems of distribution systems, they offered for consideration such changes as: revising rate structures to cover additional costs of serving low-power factor loads; increasing secondary voltages to either 240 volts delta or 240/416 volts Y; banking of transformer secondaries for greater capacity adopting industry-wide voltage regulation standards determined by actual needs and worth to customer with greater tolerance for short-time peaks; bus voltage regulation; increased use of presently standardized equipment and extension of standardi-

Aboard the good ship "Glorietta" on trip around San Diego Bay



Henline Anzini Buckley

Killgore Lewis Spease

ation to equipment not now covered; onger life overhead construction and se of aerial cable; and many other ractices which merit careful investiation. Spirited discussion showed that ome work is being done along these ines but pointed up the need of proiding sufficient talent and man-hours or substantial research in this vitally mportant field.

In the field of power generation, . L. Killgore, USBR, outlined excitaion problems in hydroelectric generaors supplying long transmission lines, oncluding with a brief description of he recently developed excitation sysem incorporating a stabilized self-xcited main exciter, static voltage egulator and rotating amplifier. Based n apparent superior performance and elative simplicity, it appears that this ystem may become standard equipnent for hydroelectric units, he said.

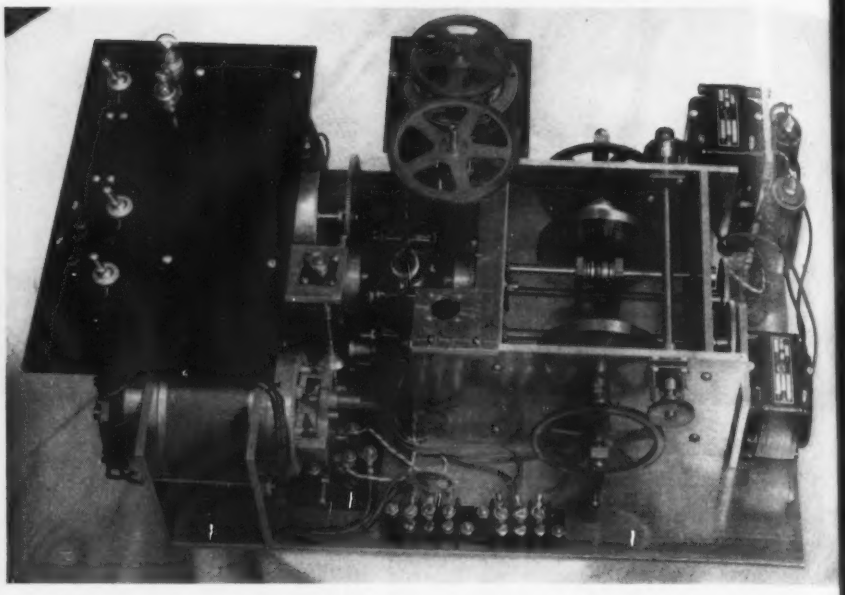
For the closely allied function of ower system governing a model of a echanical derivative computing servoechanism was shown by T. E. Curtis, Pacific Gas and Electric Co. This device continuously computes ø, torque angle of the system compared to a primary frequency standard, $d\phi/dT$, change of torque angle, and $d^2\phi/dT^2$, rate of change of torque angle. This provides a direct measure of the inertia of the system and a means of determining the exact correction needed to compensate for any changing load conditions.

F. M. Lewis, superintendent of the Bonneville Power Plant, touched on another aspect of power generation in analyzing original difficulties with thrust bearings carrying rotors of unprecedented weight in the Bonneville units. A number of wipes on the initial bearings in these units was attributed to a design which may have overstressed ease of installation and maintenance. Subsequent redesign based on field experience resulted in bearings which have given some six station years of very successful operation, "and recent inspections," concluded Lewis, "give every indication that this type of operation will continue."

A simple and inexpensive method for accurately measuring steady-state and transient voltages on high-voltage systems was outlined by H. L. Levinton, Bonneville Power Administration. An electronic amplifier is used to provide adequate current to operate a magnetic oscillograph galvanometer in proportion to input voltage obtained from capacitance voltage dividers, which he also discussed. One form of such a voltage divider is shown in the accompanying photograph of a bushing tap with auxiliary capacitors, protective film cutout and other accessories mounted in the box on the side of the breaker. Connection to the amplifier is through coaxial cable to minimize possibility of electrostatic or electromagnetic effects. The equipment is quite flexible, and can readily be adapted, for instance, to measure voltage across circuit breakers during operation, or neutral to ground voltages on ungrounded systems.

Simplification of the long and in-

Hill Bissiri Hinson Morris Garman Bettannier



Bushing tap capacitance potential divider (left), one of types used with an electronic amplifier and magnetic oscillograph galvanometer to measure steady state and transient high voltages by method outlined by Harold L. Levinton, BPA. Metal box on side of breaker contains paper, mica capacitors, protective film cutout and other accessories. Feed to amplifier is through coaxial cable. Right, Model of mechanical derivative computing servomechanism for power system governing shown by T. E. Curtis, Pacific Ga and Electric Co. Three-phase voltage from the powe system and another from a frequency standard are fe into the six terminals (bottom). Machine mechanicall computes torque angle of system, change, and rate o change of torque angle, thereby determining syste inertia. This in turn determines the exact correction t be applied by the governing system with no overshootin

volved problem of determination of effect of a broken conductor on sag in suspension spans was covered in a paper by A. Bissiri and M. Landau, Department of Water & Power, City of Los Angeles. A series of tension length curves is calculated and plotted, then standard calculation forms are used to apply these curves to determine increased sags should a conductor break.

In an entirely different phase of transmission line problems, G. Leslie Hill, Pacific Gas and Electric Co., said that tests have definitely shown and subsequent field experience has demonstrated that the high-pressure water stream method of cleaning insulators is not only practical, but safer and more economical than other methods used. Supporting data indicated this to be one of the best opportunities for reducing maintenance costs on transmission and distribution lines. Figures presented indicated a unit washing cost of $0.14 for 76,237 insulators on lines of 12 to 100 kv., representing a saving of over 50% compared with other methods.

Interestingly enough, Hill stated that the most thorough data found on fire nozzles were the result of experiments made in 1889 from which a nozzle was developed which is still in use with little or no change. Nozzle used for this application is the result of extensive investigation and development by Hill and his associates.

Of great interest to all in attendance was an evaluation of the *Biological Significance of the Bikini Tests* given by Dr. A. W. Bellamy at the evening banquet. Dr. Bellamy, professor of biology at UCLA, showed a color film made by the joint task force of Operation Crossroads, and followed with an outline of the far-reaching secondary effects of use of the atomic bomb.

In addition to the above mentioned papers which were among those of particular interest to power engineers, the program included electronics, communication, aircraft engineering and an all-day Sonar Symposium. These, in addition to well-planned inspection trips and entertainment, made for a program which will be a challenge for Spokane where the 1948 meeting is scheduled for the last week in August.

Idaho Contractors

Revival of a state electrical contractors association in Idaho is being contemplated by a group of contractors as an outgrowth of the cooperation developed among contractors in sponsoring a state electrical licensing and inspection law. That law was passed at the recent session of the Idaho legislature and signed by the governor. William Hopper, Gem State Electric Co. in Boise, was named temporary chairman of the organization and Carl Baldridge, Idaho Power Co., secretary. The latter has assisted dealers and contractors in organiza tional work for many years.

The Idaho law calls for examina tion and licensing of contractors an wiremen and requires that electrica work shall be installed according t the National Electrical Code. Citie which have ordinances or codes fo wiring are allowed to continue unde their own rules. The new law provide for an examining board consisting o one contractor, one journeyman an one member of the Department o Law Enforcement. License fee for contractor is set at $60 with a $4 renewal fee; that of a journeyman $ per year with $2 renewal. No provi sion, however, is made for inspectio to see that the rules of the Nationa Electric Code are followed.

The contractors association, sai Hopper, would work for measures t improve this basic law and provide for inspection, particularly in rura areas where fire protection is lackin and hazardous wiring has been un restrained in the past. It was contem plated that the state would be divide into four sections or divisions—north ern, southwestern, southern and south western, with members of the boar from each section.

● Oregon Refrigeration Contractors Association, Inc., headquarters i Portland, became the 19th affiliated as sociation. Albert Freeman is president C. J. Bell vice-president, Ransom D Meinke secretary.

PANORAMA OF THE PCEA

Edited by A. X. Schilling

all Conclave t Fresno

"We'll talk it over in Fresno!"

That's what the boys are saying, as ey make plans to attend the PCEA ll Conference, scheduled to be held that city on Dec. 4 and 5. And ere'll be plenty to talk about, judging om the reports.

Delegates will register for the con-ntion at the special desk provided in e lobby of the Hotel Californian, be-nning the evening of Wednesday, ec. 3. Early arrivals are urged to reg-er as soon as possible, to make way r those who unavoidably arrive at e last moment. Complete details re-arding hotel accommodations and eeting places for various events will e mailed to all members about Nov. 1.

The conference will open Thursday orning, Dec. 4, with a meeting of all elegates to hear a symposium on "Our b in 1948" presented by the manu-cturers, distributors, appliance deal-s and utilities.

Thursday afternoon and the morn-g of Friday, Dec. 5, will be devoted parallel sessions conducted by roups of the three sections.

The entire Business Development ction will meet as a single unit to ar reports from these committees: quid petroleum gas, industrial power, gricultural power, modern kitchen, me laundry, home lighting, home conomists, code and ordinance and dequate wiring.

Interested groups of the Administra-ve Services Section will hold discus-ons on the following: purchasing and ores, personnel, accounting, credits nd collections, and customer relations.

Groups discussions by units of the perating Economics Section will be eld on these subjects: steam genera-on, hydrogeneration, substations, me-ring, transmission and distribution, ransportation and communications.

All the delegates will gather again or a luncheon Friday noon, during hich an interesting speaker will dis-uss a timely subject of general in-erest.

On Friday afternoon, immediately ollowing the luncheon, all delegates will hear a presentation consisting of pointed brief summaries of all of the group discussions, so that every delegate will know of the principal items of interest covered in all meetings. Thus, each delegate will be able to participate in those discussions that particularly interest him and still be able to hear a synopsis of the meetings he was not able to attend.

Reports indicate that our new president, H. H. "Kelly" Courtright, is straining every muscle to make this conference still bigger and better, one to be remembered for its genuine value to every delegate. Every member is invited—even urged—to be a delegate.

Earlier Meetings

Future Fall Conferences will be held earlier in the year following this year's event, it was decided by the Board of Directors during its Sept. 18 meeting in Los Angeles. The board came to this conclusion after consideration of the recommendation of the President's Advisory Committee, which pointed out that meetings held in December were difficult for some members to attend due to the fact that winter weather often held operating department members on their jobs. Other reasons advanced in favor of an earlier meeting date were that December meetings often precluded attendance by members concerned with inventories, the Christmas business and year-end accounting.

There wasn't time for the new plan to be put into operation this year, but look for future fall meetings to be held late in October or early in November.

● The Farm Electrification Revision Committee is busy now, making revisions to bring the handbook up-to-date. Meanwhile, the sub-committee on educational classes is working with the staff of California Polytechnic at San Luis Obispo with a view to including a lecture series on farm electrification during the summer school program for 1948. Agricultural teachers from rural high schools are required to attend the summer school. Similar sessions conducted by PCEA's committee prior to the war were well received by school authorities and proved to be an effective means of informing teachers of developments in the farm use of electricity.

Dellman Honored

G. H. P. Dellman, who recently disclosed that he will retire soon from the San Diego Gas and Electric Co. and therefore will be unable to continue his committee work, has been honored by a special resolution passed by the Board of Directors. The resolution warmly commended Dellman for his excellent work during the many years he has served as chairman of the technical sub-committee of the highway lighting committee and pointed out that the unselfish efforts of Dellman and his committee undoubtedly have prevented many deaths that may otherwise have occurred on improperly lighted highways.

G. M. Rankin, Southern California Edison Co., succeeds Dellman as chairman of the committee.

● The new 1947 edition of PCEA's Uniform Electrical Code has been published and copies have been mailed to the electrical inspectors and attorneys of each of the 92 cities and three counties that previously adopted the 1941 edition. With each copy went a letter suggesting that the new edition be adopted and the early response indicated that the new edition will be adopted in every case. In addition, copies have been mailed to municipalities that have not yet adopted the Uniform Electrical Code and it is expected that some of them will join the ranks. Support has been given to the code by Richard Carpenter, legal counsel for the League of California Cities, who will publicize the code through the league's regular newsletter to its members.

● During the first eight months of this year, 989 applications for the Red Seal Adequate Wiring certificate were received in the territory of Southern California Edison Co. During the same period, 471 of the jobs were completed and certificates issued.

ELECTRICAL WEST
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

More Power, Less Smoke

WESTERN chambers of commerce used to yearn for smokestacks. They were symbols of industrial development and the West was anxious for such growth. Those days are gone.

Electricity is replacing the smokestack and the long wanted industrial development of the West is *here*. It has come like a tornado, and with it has come population and the need for myriad services both for industry and for that population. And this again has put big demands upon the electrical industry—every branch of it.

Not alone the utilities are pressed for more kilowatts to be used by factory, farm, office, store and home. The contractors and wiremen are pressed for installation, wholesalers and manufacturers are pushed for equipment and supplies, dealers are hounded for appliances and lighting. Electricity is the preferred fuel, the wanted motive power.

New processes, such as the freezing of fresh foods, have a higher kilowatt-hour demand per unit. But they produce superior products. The continued growth of this new industrialization, as shown by Mr. Fleischmann in this number, depends upon even more expansion of the generating capacity in the West. Every worker in the West has more electrical horsepower to aid him than have workers in other regions.

In all the signs, the indexes and the crystal balls, the West has nothing but great promise of productivity and prosperity for many, many years to come. There is no recession in the West—it is expansion.

Power and Salmon

RESOLUTION of the differences between the fishery and the power, irrigation and navigation interests over future development of the Columbia River would be an excellent accomplishment. For the first time since the controversy started such a possibility is apparent. The Department of the Interior has proposed a concession that will permit at least a ten-year study of the fishery problem. It suggests that no main-stream dams other than those already scheduled be constructed on the river.

For their part the fishery people raise no objections to nine future dams plus Grand Coulee and Rock Island, whose potential power is rated at in excess of 8,000,000 kw. In return they request that no future dams be erected unless and until definite and proven benefits can be shown. They propose that dams least harmful to the fishery resources be given priority. They seek completion of power and irrigation facilities in existing dams before new structures are erected. Finally they insist upon plans for hatcheries, stream clearing, fishways and other conservation and rehabilitation aids based upon competent recommendations before any cycle of salmon is damaged or destroyed by a dam.

Obviously there are, for the first time, grounds for a sound compromise in the points of view expressed by the power and irrigation advocates and the fishery people. Only if all of the natural resources of the great Columbia River can be preserved will the Pacific Northwest receive the maximum benefits.

Atomic Power Dream

ELECTRICAL engineers, speculating on the ultimate application of atomic energy to power generation, inevitably reach this vital question: Will nuclear fission produce useful electrical impulses directly without recourse to energy transformations through heat and mechanical cycles? Some of the nuclear scientists emphatically deny such a possibility; others hedge with the assertion that no research to date leads to any such conclusion.

Without citing the meager scientific testimony and evidence which might support such a radically new energy release process, we are inclined to take a positive position in our speculations on the subject. In the light of the past, we are unwilling to write off such a possibility. What sane individual in 1880 would have predicted that five billion kilowatt-hours of electric energy would have been used in one week to power American industry, to light, cook, heat, transport and entertain for American people? In 1900 the man who asserted that 25,000,000 automobiles would one day operate on American streets and highways, would have been considered a fit candidate for an asylum. Imagine the laughter and disdain that would have

EDITORIAL VIEWS

greeted the prediction in 1910 that almost every American home today would have a radio and many of them two or three. And if the foolish prophet had included television, he might have been hustled immediately into a padded cell. And who in 1930 even would have predicted the atomic bomb with all of its awfulness? Yet the Atomic Energy Commission has just released a report that 5,500 atomic energy inventions have been studied and docketed and 2,300 have patentable possibilities.

We are not counseling the electrical industry to prepare for such a radical atomic power development tomorrow, nor would we recommend investors to sell their utility securities. We simply contend that in time, science and invention are liable to transform the wildest dreams and the weirdest speculations into realities.

Price-Conscious Public

PRINCIPAL topic of conversation in the American home today isn't Russia, the Marshall plan or the Taft-Hartley Act. It is prices. Every newspaper has at least one headline on the subject each day. The radio newscasters keep the housewife informed on price trends and expert opinions. And why not? The subject touches the ordinary American citizen at his most sensitive and vulnerable point—his pocketbook. Politicians have suddenly awakened to the fact that rising prices, not labor or foreign affairs, will be the major campaign issue. Conceivably the people on whom blame can be placed for the price dilemma will be the losers. And most certainly the subject will continue to be front page news.

Herein lies a golden opportunity for the light and power industry to capitalize on its unique and almost solitary record. While prices for everything else have headed ceilingward, the cost of electric service has continued downward. It is the only item in the family budget for which such an assertion can be made. This record is something for which the electrical industry can be proud. It is a record that merits commendation and acclaim. It is a record that should win public favor. Perhaps some judicious advertising and publicity now would help to win that acclaim. Let the industry's able advertising people go to work on it.

OUR country was founded and has grown great on the philosophy of Liberalism. Challenging the substance and reality of the gains of Liberalism is the philosophy of Socialism; to be more precise, the philosophy of a totalitarian, regimented society. The Liberal philosophy holds that government is an agent of its citizens, the Socialist philosophy, that it is their master. The first philosophy would limit the exercise of political authority to the restrictions of constitutional law, and so preserve some humane consideration for individuals and minorities. The second mocks at this "legalistic" theory of state, and holds that it is the function of government to remove all disabilities to anybody's enjoyment of a life of material abundance, to substitute for the consent of the governed the economic demands of pressure groups, supported by physical force. The Liberal philosophy holds that there are certain necessary truths about the good life, to which individual and social behavior ought to conform. The Socialist philosophy holds that such truths are mere "ideologies"—i.e., they are merely a way of making people believe whatever is deemed expedient that they should believe in the struggle for the material advantage of a class or political party . . . Call it what you will, every socialistic movement means (1) the destruction of a government of checks and balances, of principles, of rights, of parliamentary meeting of minds and popular suffrage; (2) it means government by decree, bureaucratic planning, and concentrated, irresponsible authority; (3) it means the regimentation of the population by means of the expropriation of employing capital, and the taking over of the ownership of the wealth of the nation by a class of successful professional politicians; finally (4) it means the end of the system of free enterprise.—Dr. Robert Gordon Sproul, president, University of California.

HEALTHY ROOTS MAKE STRONGER BUSINESS

So the Inland Empire Electrical Dealers Assn. goes to the root of factors that make or break an appliance business

Arnold Kuhnhausen, Portland dealer president of Northwest Appliance Dealers, addressed Spokane association. John Boothe, IEEDA pres., at le

IT'S a paradox—but the individual business does better when it cooperates with others. That is why there are associations.

In the West this idea is no newcomer. Neither is one of its most valuable associations—although its name is new. The Inland Empire Electrical Dealers Assn. existed in a different way prior to the war. Reactivated, it has a brand-new program, and a new young manager who is putting something new into its direction.

That "something new" is cost analysis and related studies—such as merchandising budgeting, salesmen's compensation (published last month in ELECTRICAL WEST Sales Guide), employees discounts. Of course there are also the customary other activities—sales promotions, campaigns, membership meetings, promotion of fair trade practices and good ethics, development of mutually beneficial relations with manufacturers and wholesalers, coordination of trade-in practices. It has decalcomania emblems to identify the dealer store with the promotions of the association. It has inaugurated a tracer service in cooperation with the police to track down stolen appliances and radios.

Something else new that it plans to start soon will be a series of consumer forums, at which the public will be asked to express its opinions as to dealer methods, merchandise, policies and service. This is a daring move, but Robert L. Wilkinson, executive secretary, who knows the value of research into costs of doing business, feels that research into consumer attitudes and desires will pay dividends also.

With headquarters in Spokane, the IEEDA has local units of branches in all of the trading areas in the 40,000 sq. mi. area known as the Inland Empire. Its office is on the fifth floor of the Washington Water Power Co. building, but its operations, while related to, are independent of the power company. It has chapters in Spokane, the Big Bend area, Coeur d'Alene, Lewiston, the Palouse area around Moscow and Pullman and, because of their remoteness, smaller chapters were being set up in the Prairie district and the Clearwater district and similar grouping are to be made in the future.

Its officers are active dealers. Although membership in the organization includes wholesalers, distributors, manufacturers and agents and power company sales staff, contractors, plumbers and fuel dealers who sell electric equipment, as well as retail dealers, i officers are dealers, the power compan man in the district acting as secretar because of his ability to devote th extra time to it that such a post re quires.

John Boothe, manager of Brown Johnston Co., is president of the paren organization as well as of the Spokan chapter. Richard Nelson, The Palace is vice-president. Earl Snyder, Snyde Electric, Washtucna, is president of th Big Bend chapter. George Nielson North Side Feed & Hardware Co., i president of the Coeur d'Alene chapte Carl Harris, East End Trading Co. Lewiston, is president of the Lewiston chapter. Charles Fanning, Fanning Im plement & Hardware Co., Oakesdale is president of the Palouse chapter.

At two joint meetings held in Spo kane and Moscow in August, Wilkin son reported to the membership prog ress to date on the associations proj ects. The association had issued a roster of more than 200 members, co

At left, Coeur d'Alene chapter members at the Spokane meeting. George Nielsen, Northside Hardware, chapter president; Charles Whiteley, Whiteley Electric; Gene MacDonald, MacDonald-Wilson Tire and Electric, all of Coeur d'Alene. Right, Palouse chapter visitors, led by president Charles Fanning of Oaksdale. With him, Ed Falls Jr., Appleway Supply Co., Dishman; Don Rohrer, Spokane Electric and Harry South of St. Mary's Electric, St. Mary's, Wash

Big Bend chapter leaders attended the Spokane meeting—W. E. Snyder, Washtucna, chapter chairman; F. W. Denson; Frank Reinbold, Davenport Tractor & Implement Co., both of Davenport. At the Moscow, Idaho, meeting, IEEDA Executive Secretary Bob Wilkinson, standing, reporting on its program; At the left of him are Charles Fanning, Oaksdale, Wash., Palouse chapter chairman, and L. A. Winn, of the Washington Water Power Company, its secretary

ducted a cost ratio study for 1946 business, and sent a constructive letter about it to all national appliance manufacturers. Replies had been received from a large number, most of them commending the association on such a constructive approach to a controversial subject (dealer discount ratio) and announcing their policies. A second cost ratio study for the first quarter of 1947 was being published for distribution. It had issued a monthly news letter of pertinent selling and business management advice, was preparing a sales training course for dealer sales people. It was arranging to supply its members with a trade-in guide. It had established a stolen merchandise tracer service. It was preparing a study on L-P Gas competition. It was making a list of services being offered by its distributor and manufacturing members. It had issued a study on various ways to compensate salesmen. It planned a simple cost accounting system for dealers.

Frank Tool, Washington Water Power Co., secretary of the Spokane chapter, outlined promotional programs to be undertaken this fall. These include a participation in the national lighting and certified lamp campaigns, a radio promotion to tie in with Radio Week, an electric blanket promotion, lighting schools for lamp sales people, a home freezer promotion. Consumer panels would also be initiated soon among women's groups to learn what women want most in appliances, what styles, types, what information, what price range. All of this would be relayed to manufacturers to aid them to design to meet an expressed need.

Educational and inspirational meetings are also held periodically. At these August meetings, Arnold Kuhnhausen of Portland, president of the Northwest Appliance Assn., was the principal speaker. He discussed the trade evils that dealer organizations such as this must seek to correct.

With such an energetic leadership and so basic a program, the dealers of the Inland Empire region have all the attributes of individual initiative and private business enterprise, with the added strength that capable organization can bring in handling many of the big problems the individual would be too weak to tackle alone. They get the benefit of each others' experiences, their cost ratios, budget control techniques and merchandising helps. The others in the industry benefit by having such a hard-hitting sales organization in the field pushing their products and working as a team to make living in the Inland Empire all electric.

Sales Test

In an all-out campaign to sell electric irons Proctor Electric Co. of Philadelphia has selected San Diego as the key city for an experimental test lasting from Sept. 1 through Oct. 15. To determine the effectiveness of its new merchandising program and to stimulate competitive selling in San Diego. Proctor Electric is using every available media, including a local theater to put on demonstrations for the instruction of dealers and personnel.

Charles Culbert, Pacific Coast manager, enumerated the reasons why San Diego was chosen as the "guinea pig" for such a test; it is the home of the Bureau of Radio and Electrical Appliances; through leadership of Bureau Secretary-manager J. Clark Chamberlain, San Diego dealers have always cooperated fully in putting over activities and promotions; cooperation and support of the San Diego Gas & Electric Co. is available; and because of its good local government and the conservative taste of its citizens San Diego is a representative section.

Design Patented

A patent has been granted for a unique water heater design developed by the late Jared A. Hill, former residential engineer for Pacific Gas and Electric Co., San Francisco, and his widow, Mrs. Elsie M. Hill, is seeking arrangements for its manufacture. The water heater embodies a number of unique and cost-saving features. It is designed for individual installation at each basin or bathtub. With small tank sizes of standard dimensions (3½, 5 and 10 gal.) it operates at low pressure with the hot water vent open to the air at all times. It can be built of lighter-gaged metals. This construction eliminates corrosion due to oxygen in the water under pressure. The water heater uniquely operates by introducing cold water into the tank by means of foot-pedal faucets. This eliminates faucets operating under high water temperature and likewise eliminates the pressure in the tank. By installation at the point of use, radiation losses are eliminated. There is no long piping of hot water. Water is also saved since hot water comes forth immediately on stepping on the foot pedal and no waiting to fill the pipe is required. By using small tanks with standard elements and thermostats at each faucet location ordinary 110-volt circuit wiring can be used to supply each heater.

The heater was designed by Hill as an answer to many of the problems confronting the electrical industry in water heating. He felt that by reduction of heat losses electric water heating could be competitive even with low-cost natural gas.

Boise Branch

As a distribution center Boise, Idaho, increased its importance when Westinghouse Electric Supply Co. opened a new branch there at 710 Front St., on Aug. 15. Manager of the new house is Art B. Darby, former merchandise manager at the Salt Lake branch, with John Cameron and Gene Rousey as appliance representatives; Gene Clayton, appliance service representative; Howard Strickler, service manager; James Adolphson, stores manager; Henry Oater, warehouse foreman, and Dorothy Cooper, secretary.

The original building, erected about 35 years ago, was completely rebuilt by Westinghouse Supply. An area of 14,000 sq. ft. on two floors provides space for a display of Westinghouse appliances and materials, offices and warehouse facilities. At the front of the building windows make visible the appliance display and offices which are finished in light shades of green. Rail facilities at the rear of the warehouse provide quick service to customers.

At the opening several well-known men from the Los Angeles district, to which the Boise house is attached, were present, including L. G. Berger, district manager for the southern California district in Los Angeles, and Gilbert I. Hicks, district stores manager from Los Angeles. From San Francisco, J. J. Moffatt, Pacific Coast manager of the Electric Appliance Division of Westinghouse Corp., attended the opening; from Salt Lake City John Longden, branch manager, and P. A. Maughan, apparatus and supply manager, headed a delegation. With the opening of the new branch at Boise, the number of either branch houses of national distributors or independent wholesalers serving out of the city is increased to seven.

Los Angeles and Salt Lake City came to Boise for the opening of the new Westinghouse Electric Supply Co. branch there last month. A. B. Darby, left, new branch manager; L. G. Berger, Los Angeles district manager, under whom the Boise house is a branch; and John Longden, Salt Lake City manager

● B. C. Electric Railway Co. has announced a new phase of its dealer cooperative sales plan. When the company started two years ago to break away from the major appliance field, it offered to dealers an advertising allowance and unit bonus on appliances sold. It is felt now that the $3 unit bonus paid on ranges can better be used to aid dealers in other ways. Under the revised plan, on sales made to residential accounts, the B. C. Electric will pay the dealer an advertising allowance of one half of one per cent of reported sales volume on electric and gas appliances listed on the retail dealer's appliance sales report. Allowances will not be granted on radios and record players; the $3 unit bonus on gas and electric ranges and automatic water hearters is being discontinued.

As part of a nation-wide test to determine accurately how much electricity can do to lighten the housewife's tasks, Mrs. Howard Sperber of Colville, Wash., wore a pedometer and kept a careful record of her daily activities for 13 weeks last spring. (She walked 110 miles during the test!) The power company is running a line and cooperating manufacturers are eqipping her home with electric appliances so she can repeat test next spring using all modern methods

ELECTRICAL WEST Sales Guide

FOR THE ELECTRICAL MERCHANT OF THE WEST © October, 1947

Turn the Heat on Heating Pads

There's an all year round market for them

Pain and discomfort are no respecters of season. They come at any time. Naturally the cold, wet season brings more of them, and hence the need for electric heating pads. But with an eye to year 'round business the ideas which sell heating pads are those that will make them a constant source of profitable sales. In fact, Casco, one of many manufacturers of quality heating pads, suggests a number of such selling ideas and declares the seasonal idea is outmoded.

Its field surveys and product checks indicate that there are potential sales of heating pads to 8 out of 10 persons. Yet only 2 out of every 10 now own one, and most families could make use of more than one. With high-quality, Underwriters' approved, fixed heat and wet-proof heating pads now available, the field of safe and beneficial application is greatly expanded. This means more sales to more people if those people are told and sold.

Most manufacturers have sales aids, displays, programs to follow. But these suggested by this manufacturer are excellent for all.

First is suggested that everyone selling heating pads understand that the modern, quality heating pad is the modern successor of the old chemical pad and hot water bottle, neither of which keeps its heat and both of which may develop leaks. The fixed heat pad maintains constant temperatures safely. The wet-proof pad is safe even with moisture from sweating or wet applications.

To sell them it is wise to suggest to the customer the **use** that is served. This can be suggested to any and all appliance customers who come in to the store. A way to remind them and to open the conversation is to use a heating pad at the cash register counter. Plug it in and set it at a low heat. Return the change to the customer by placing it on the pad. Its warmth may evoke surprise and open the conversation for selling a heating pad.

Sales Opener

"Here is a handy appliance you probably have not thought about," is one excellent opening suggestion.

In gift time, "This makes a very much appreciated gift. Chances are your friend does not have one. Eight out of ten people do not and everyone can use more than one."

To a mother with a baby—"Babies usually kick off the covers and either freeze all night or keep you awake recovering them. Now here is a safe, wet-proof heating pad you can use to keep them warm."

With these ideas planted, a salesman can tell quickly the other uses for a quality heating pad and still further build the desire to own one.

What it Does for People

In its training pamphlet Casco lists what a heating pad is good for:

Relieving pain from headache, sprains, arthritis, colds, sinus, bruises, rheumatism, menstruation, strains, bumps, stiffness, soreness.

For warm comfort on cold nights. For children that escape the blankets.

For insomnia. A warm pad on the pillow at the back of the neck is relaxing.

For treatment of some skin conditions.

Display Ideas

Displays that dramatize the **use** story of this appliance in the most direct manner possible pull the greatest traffic. They should be simple rather than elaborate. They should tie in with situations appropriate to the season or to the conditions probable at that season.

A perfect tie-in with summer vacation season can be made, for instance, by a display that asks, "Where do you hurt?" with suggestions of the bruises, strains sprains and muscular soreness the vacationer suffers.

A window theme featuring gifts for the person who is going away. The heating pad is suggested as an answer to, "What can I give that she doesn't already have?"

An action counter display for the wet-proof pad is to operate one in a water-filled fish bowl to prove its safety.

Drama— A really human interest thought like this below dramatizes the need for a heating pad in emergencies. It was written by a saw mill laborer in a Puget Sound Power & Light Co. "span of life" testimonial letter. Why not quote it on a window card in a display of heating pads?

Our new born baby was "blue" with cold—my wife's vitality was equally as low. HEAT—quick, uniform heat was needed—and thank God I held the answer! A home with electricity and two high-quality heating pads gave my loved ones the life-giving heat they needed and called them back from that black void called death. Yes, all electrical appliances are useful but to speak of electrical Heating Pads is to speak of something sacred. Whenever I buy an electrical gift I always choose the Heating Pad. I would like to see one in every home—they are producing healthly, comforting heat, even saving lives, every day throughout our beloved land.

Electric Blankets are a Warm Profit Item

Evolved from the heating pad, improved by the wartime techniques of making heated aviation suits for high-altitude flying, the electric blanket and comforter are now come into their own. And they offer a live dealer and a good salesman an opportunity for selling a sizable unit priced item to a large majority of the public. There is no trade-in problem. The market is almost unlimited. Saturation as yet is almost too small to record. But acceptance is higher than with most any new electrical device. The electric blanket or comforter has real appeal.

Even the device that everyone should want and most people do want, still requires selling effort. In the case of the blanket the sales effort must overcome the resistance of the original outlay of money. The operating cost, in this country where low rates prevail, does not bother many people. And it is so low it can easily be sold.

Sales resistance in selling electrical blankets comes from **price comparison** with an ordinary woolen blanket, or from the fact that the housewife has what she **thinks** is enough **stock of bedding.** The purchase of more or of a blanket costing about twice that of a woolen blanket of good quality may appear to her to be an unwarranted luxury that she should not indulge in.

To smoke out the particular objection that any given customer may have takes a question or two. Nothing very difficult about it.

If a customer approaches a display of electric blankets or comforters in your store, instead of addressing her with the customary, "may I help you?" it is better to plant an idea with your very first words. Say something like this:

"It is almost unbelievable the comfort and lightness of these electric blankets. Think of it, with one blanket alone, no matter what the temperature, this blanket keeps you just cozy and warm. May I show you its features?"

With such an approach you have made two sales points—the blanket's **lightness** and its **assurance of comfort** in any weather. If this does not draw forth the reason for resisting its purchase, at least it gives you the basis for asking more questions.

These questions are good: "Have you ever thought about getting one?" "Do you have all the blankets you need for the cold weather?"

Answers to either one should give you the cue to the resistance. The real reason may not come out at first. She or he may first throw up a feint. It may be a question as to its safety. It may be as to its price. The hardest to meet is a show of disinterest or refusal to be tempted. To meet any particular resistance successfully is to assemble the benefit points of the electric blanket that apply particularly to that objection.

Safety you can answer with assurance of Underwriters' approval, of sturdy construction, of the record of experience. After answering the negative suggestion of unsafeness, put forth several appealing suggestions of comfort and peace of mind.

"And with this positive safety comes that wonderful relaxation that you can enjoy knowing that no matter if it turns suddenly cold you will be snug and protected. You can sleep with windows open and let the automatic control see that you are just right."

Price, or resistance to pampering oneself, you can meet with a different group of benefit appeals. Here you overbalance the objection with long-range economies.

"Yes, I know it may seem a lot to pay for just one blanket, but isn't it real economy, though, when you think one blanket is **all** you need? Then too, think how much

weight is saved. No need to be burdened down with the weight of many blankets when it is really cold. Less blankets to wash and to store."

To the person who declares that she has plenty of bedding now and cannot invest in any more, the appeal has to be made on grounds of having **a better way.** This is sometimes difficult, but remember that most people will discard older, less satisfactory ways in favor of newer, better ones. So put it on that basis:

"I can understand that very well. It is very prudent of you to feel so. But when you **do** get ready to change to this **more modern,** and much more **comfortable** and **satisfying** way of sleeping, let me review the good things I have told you about this electric blanket for you. I should like the pleasure of selling one or more to you and knowing what a blessing I could bring to your household. People who have bought them from me make me feel that way about these electric blankets."

And if you own and use one in your **own** home, you really **can** wax enthusiastic about them and convince prospects thereby.

Be Financially Successful by

Keeping Control Through Records

Second of a Series by

KEN HAMPTON

Financial success is the goal of every business. People invest money in business for the purpose of receiving back from that business a share of its earnings. Business exists to make a profit. When profit ceases over any prolonged period so does the business.

The means by which profit is recorded is the accounting system of a business. Business and financial men are trained to look at the record of a business and from that record to judge the success being attained by its management.

There is no substitute for good business judgment but—good business judgment doesn't just happen. It is born of experience and directed by facts. The facts come from records both within and outside of the business.

The accounting records of a business are the road maps that show the owner where he has been and point the direction in which the business is going.

It is important to have good understandable records. Records may be simple but they must tell four things: (1) **what the business has;** (2) **how much income it has received;** (3) **what it owes; and** (4) **its total expenses.**

Operating costs are higher than they were. Margins are closer. Labor is more expensive. Rents are higher. Firms are paying high prices for merchandise. People no longer come into a store and fall over themselves to buy just any old kind of merchandise. And so the merchant has to depend more and more on the efficiency of his store operation. That's just plain everyday common sense.

There is one angle of business that has a lot to do with how efficient it is. That's **the way its records are kept.**

A set of records should be kept for the business itself. The owner should think of and treat his business as a separate entity. It is his servant, designed to make an income for him. As such it should keep records of how it is using his money and whether he is gaining or losing on his investment.

Accounting records are kept for guidance of management. They are the log in which the day-by-day business journey is recorded. They are the recorded history of yesterday's effort—in them lies the record of past experience **to point the way for future success.** For that reason, both their proper keeping and correct use in judging results is vital to good management.

In retailing electrical devices, proper record keeping is doubly necessary because of the relatively narrow margin of net profit earned by retail appliance stores. A recent study by the Department of Commerce, of 391 firms, reported an average net profit of 2.5% for stores selling electrical appliances.

If this is to be the normal return in normal competitive times, then it behooves all retailers to keep and use a record system that will give them the financial facts about their business clearly and at a minimum cost. We propose to discuss in a series of articles the proper use of information from the accounting records in directing the financial success of your business.

Whether your business is large or small, it should have a record system that meets the following requirements:

1. **It should be simple.**
2. **It should give you the facts you need.**
3. **It should cover every transaction and still be easy to keep.**
4. **It should cost as little as possible to install and maintain.**
5. **It should grow as your business grows.**

Your records should enable you to:

1. **Budget and plan your operations.**
2. **Control your expenses.**
3. **Control your buying and stock on hand.**
4. **Tell how much and who you owe.**
5. **Tell who owes you and how much they owe.**
6. **Prepare accurate balance sheets and profit and loss statements.**

No. 4

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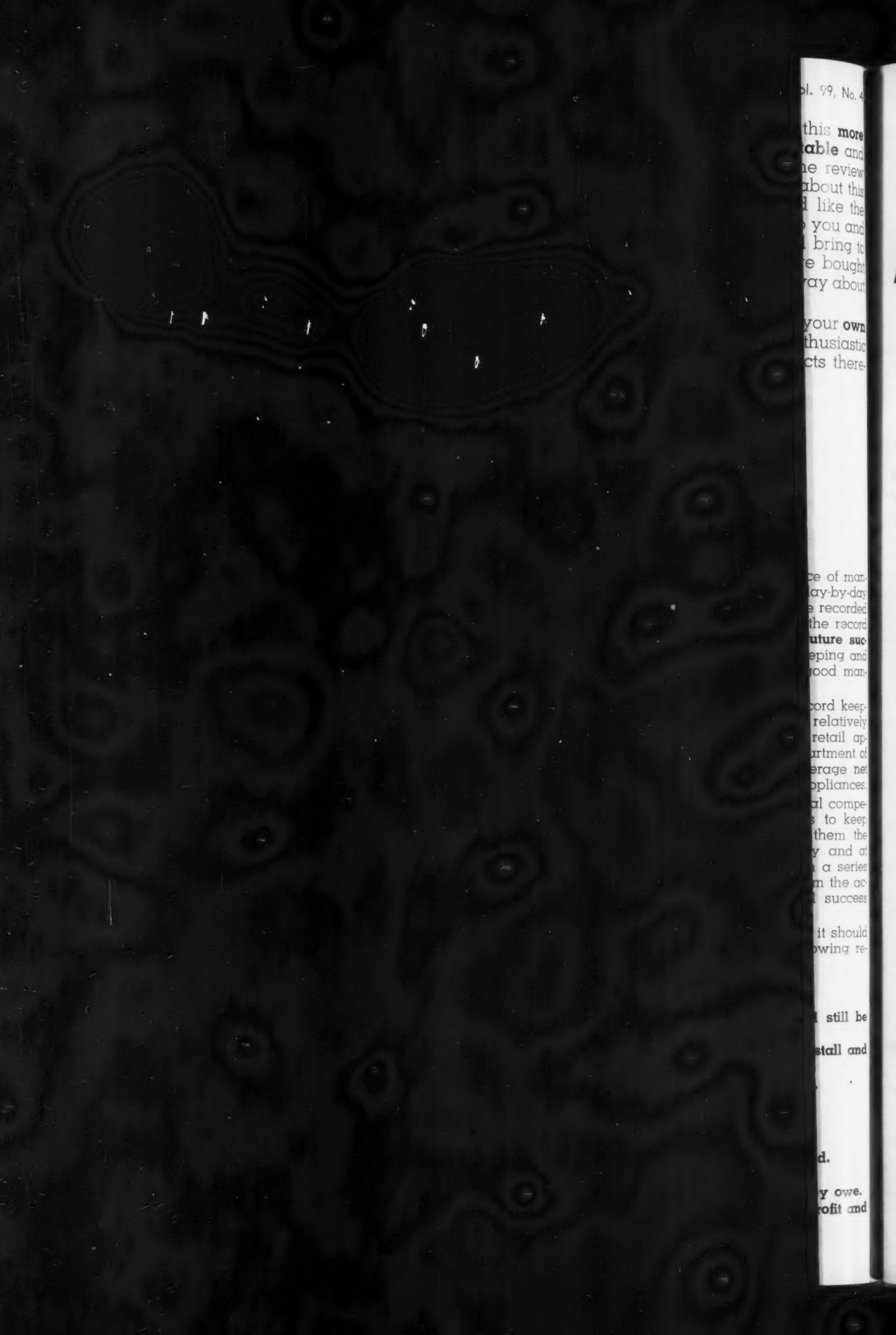

ELECTRICAL WEST Sales Guide

NEWS LETTER FOR THE ELECTRICAL MERCHANT OF THE WEST

October
1947

Regulation W is out and all controls on installment buying go off Nov. 1. This relaxation of credit control is looked upon with mixed feelings by dealers, distributors, manufacturers and bankers. They hope that all will exercise reasonable self control not to let "no money down, pay when we catch you" deals get started. The stiff terms required under regulations made for sounder business. But it did limit the opportunity of many consumers to buy new appliances they needed. The period of flush money has gone and a big down payment stopped many sales. Fortunately the supply of appliances is increasing enough to take care of some of this new volume of time-payment business that should follow easier credit terms. Banks and loaning agencies themselves propose to keep the brakes on money so that the situation will continue solid.

Self control now

Unique package deal was advertised by a Pomona electrical contractor, Vic Bongberg, and an electrical dealer, Peters-Cruse Co., offering refrigerator, water heater, range, wall heater and housewiring including 40 outlets and multibreaker panel, even lighting fixtures, for $960, on credit terms.

A deal

By invoking California's fair trade acts the Northern California Refrigeration Contractors were able to prevent a serious give-away competitive practice among dairy product distributors, who threw in a refrigerator cabinet in order to take customers away from each other. The giving of special deals to one class of customer not available to all customers is also counter to the Robinson-Pattman Act.

Lagnape

Sunbeam's Shavemaster is being given a novel introduction by the Sunbeam representatives throughout the West. Dealers and sales clerks are invited to a breakfast, unshaven, given a pitch on the market, the history of electric shaving, sales hints, case histories of selling success and then each is shown how to demonstrate the new shaver, using his own beard to practice on, says Charlie Moore.

Shave's on

Cory Corp., coffee makers people, have a new device as a result of acquiring both Fresh'nd Aire Co. of Chicago and Hil-Lor Mfg. Co. makers of humidifyers. They will make a line of Fresh'nd Aire humidifyers for winter conditioning of heated rooms, at $60, and a line of fans or circulators for summer.

Coffee to coolers

Another semi-silvered lamp globe, particularly useful in store lighting, is announced by General Electric Lamp Department. It is a 200-watt lamp. There have been 300 and 500-watt lamps of this design earlier. It has a circular inside frosted "window at the end of the bowl for downlight." — Down sparkle

Salt Lake Hardware Co. has been appointed distributor of Motorola products by that company. SL Hardware has branch houses in Boise and Grand Junction. Radio sales are headed by Heber Reese. — Appoints

With a new demonstration display, selector chart, folder, advertising aids and a sound motion picture for training, Westinghouse has a seven point promotion program for vacuum cleaners, including its automatic upright, tank and Hand-vac types. — Clean display

National Electrical Wholesalers Assn. is now issuing clever little 4-page "sales boosters" for appliance retailers and lighting contractors. Will be given wide distribution by NEWA member wholesalers. They are quick selling stimulators, their message told in cartoons, pictures and short text. First issue tells a timely hint that "Time Payments MULTIPLY Sales." — Sales booster

Sales of vacuum cleaners in 1947 so far exceed all of 1941, the industry's best pre-war year, by 43%, the Vacuum Cleaner Manufacturers' Assn. declares. August factory sales were just a little less than July, but higher than last year by 22.6%. — Report

Electrical Appliance Service Corp. now handles authorized parts and service for the Young Corp., Fall River, Mass., as well as most other makes. Its offices are at 236 Harriet St., San Francisco; 726 Venice Blvd., Los Angeles; and 302 17th St., San Diego. — New make

Youngstown dealers will welcome the new flexible kitchen display background manufactured by Mullins Mfg. Corp. Quick and easy, it can be installed in a matter of minutes, moved or dismantled without tools for any size kitchen display. — Presto

To dispose of the outmoded side-arm water heaters Seattle City Light and Puget Sound Power & Light informed dealers they will pay the cost of installation of every 50-gallon or larger automatic tank sold replacing a side-arm heater. After the dealer makes the sale he calls either utility. City Light's program covers all lines. Puget Sound Power & Light makes the offer to customers served by the Seattle, Lake City and Burien offices. — Ditch old side-arms

Important project of NERA is a cost-of-doing-business-study, among all its members. Results of the questionnaire will enable NERA members to compare their own business with sectional and national averages, and advance the industry position of the electrical retailer. — Dealer cost study

With so many advance requests for space reservations at San Diego's Tenth Annual Home Appliance Show Dec. 2-7, J. Clark Chamberlain has reported that no space is left unless it might possibly be reclaimed later. He said they actually became "oversold" but will endeavor to meet all the demands although some requests may have to be reduced. — No space left

An electric foot warmer is now being introduced by General Electric Co. It will sell at about $7.50; is made to slip between top sheet and foot of bed; should be very popular with husbands. Likewise G-E will have a new sun lamp to sell about $30. — Warm feet

Union Ice Co. in southern California has been trying to forestall electric refrigerator competition by merchandising a Coolerator ice box with a Philco 2.5 cu.ft. freezer chest to hold frozen foods. — Ice and cold

Carrier pigeons were used by the Leo J. Meyberg Co. in an unusual promotion stunt. Sent them to key dealers in northern California with instructions how to send back an order by pigeon immediately. Used them on an RCA radio campaign with excellent results. Fresno pigeons even beat Oakland birds home. — On the wing

Manning Bowman is moving its Western sales office to the Western Merchandise Mart, with George Watson, returned from wartime service now from OPA. Will be in space 445 and special display of the full line will be sent from the factory. — Set up

The battle of the freezers went merrily on this summer while Scripps-Howard newspapers made a housewife survey to determine customer preference for upright or chest types. Found most housewives wanted a combined refrigerator and freezer. — Want both

Los Angeles is tightening up on its requirements that all electrical appliances, cords, etc. sold in that large city be either Underwriters listed or labeled or bear the approval of the city of Los Angeles testing laboratory. — Enforce

Jack McLennan, former manager of the Zenith division of Sues, Young & Brown, has formed a new company, California Distributors, Inc., with J. Savenick, and will distribute Fada radios. — New

New slogan of the gas industry, in launching a big CP range drive is, "Gas has got it." Could it mean B.O.? — Hm?

Speaking to the Rocky Mountain Electrical League convention, James Bell, Electromaster, had some pertinent things to say. "Our return to a buyers market is just a normal American salesmen's market. This is the type of market that American business loves, it's the type we thrive on. — We love it

"Inevitably credit terms will be back on at least a semblance of the old basis. Merchandise will be driven out through the channels instead of being sucked out. . . Don't get excited over statistics that show that 70% of the savings are in the hands of 3% of the people. We never have concentrated our efforts in 3% of the market and we never will. People don't spend out of their savings for the mine run of merchandise. They spend out of their current earnings and they are going to have current earnings just the same as they always have." — As they earn

Philco Corp. has offered the use of its patents and inventions in the radio phonograph and television receiver field to other manufacturers on a license and royalty basis. Says RCA, G-E and Westinghouse have already been so licensed. — Pool

Apex has announced a package promotional program on vacuum cleaners for dealers enabling them to tie in with national advertising and meet the competitive market which lies ahead. Features of the package include a triple-panel display unit, a combination window or floor display, and cleaner display aids for Apex home cleaners. The program provides monthly shipments of different units of the packages with sales literature and other promotional items for the Apex dealer.

Package program

For displaying G-E lamps, streamlined units called "G-E Irwinner Line of Fixtures" has been developed at the company's lamp department headquarters. There are six basic units made of plywood which can be arranged into various combinations to form counter, floor and window displays.

Lamp racks

There are plenty of cash prizes—amounting to $3,000—offered in Silex's two-month window display contest which started Sept. 15. Any retail store featuring exclusively Silex products in a window display for at least a week is eligible. Winners will be based on photographs submitted to the company.

Contest

Now available is a 280-page reference book, "Residential Lighting," by Myrtle Fahsbender, director of home lighting for Westinghouse. The volume incorporates latest developments in home lighting, complete with photographs and tables. Sells for $10.

Light book

Stromberg-Carlson dealers were on hand for the company's first postwar open house at the Fairmont Hotel Sept. 15-18. Of particular interest—the company's latest television instruments and console combinations featuring FM. L. L. Spencer, general sales manager, brought a group of executives from the Rochester factory.

New models

Simmons announces new improvements on its electronic blanket as a result of a series of tests made by Armour Research Foundation, Chicago. Under observation were such factors as life expectancy, humidity, and "feeler resistance" of the blanket.

Improve sleeping

As part of a promotional campaign Edison Electric Institute has come out with a comprehensive program on planned home lighting, complete with educational booklets and direct mail folders for use in the electrical industry.

Lamps

The "how-to-do-it" technique of demonstrating electrical appliances is incorporated in a 15 weeks course which started Sept. 22 at the Evening and Extension Division of Hunter College in cooperation with the Electrical Women's Round Table, Inc.

Teach the girls

Proctor has assured its distributors it will guarantee price protection in case of a drop in prices and will provide a minimum of 60 days advance notice.

Promise

New television service policy for Emerson Radio and Phonograph Corp. has been set up with the formation of the Emerson Television Service Corp., a subsidiary to service all Emerson sets direct from the factory. Cost of installation including a year's service is $60.

Video service

General Electric will be back with its informal half-hour radio show "House Party" on Dec. 1. When G-E resumes sponsorship the program will be heard over CBS Monday through Friday at 3:30 p.m. E.S.T.

Back again

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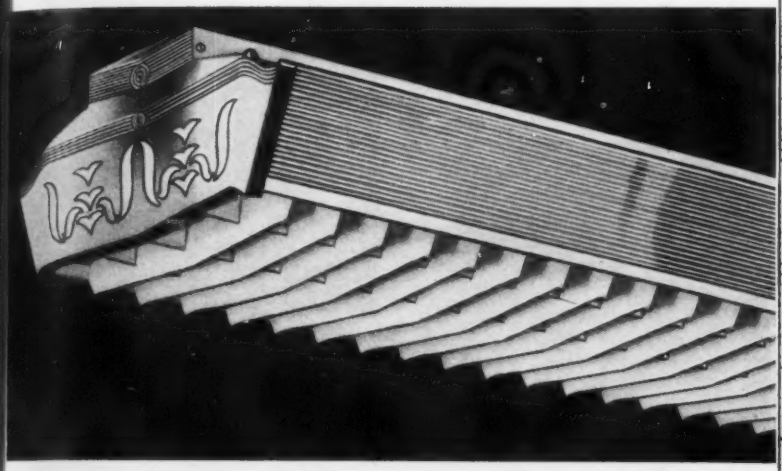
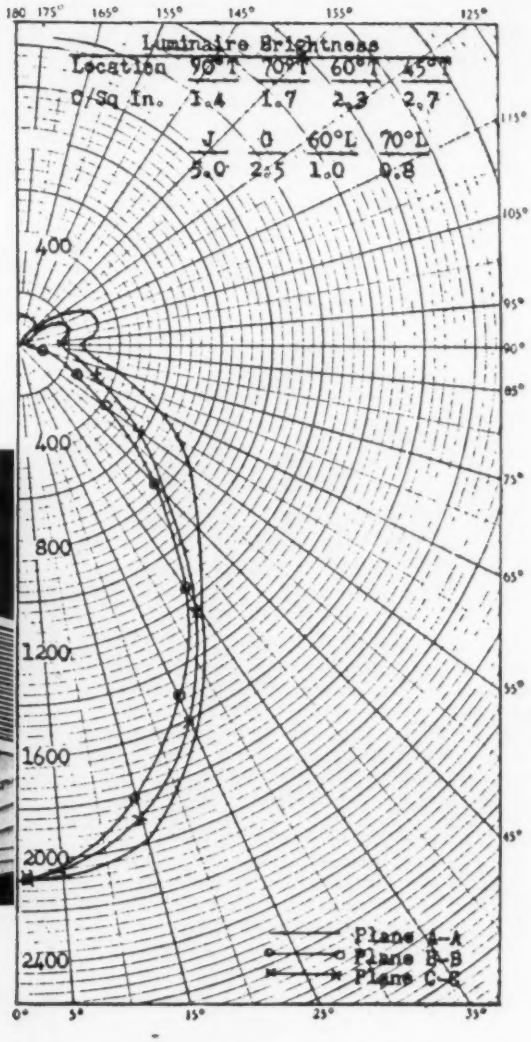
OUTSTANDING DOLLAR VALUE in Usable Foot-Candles





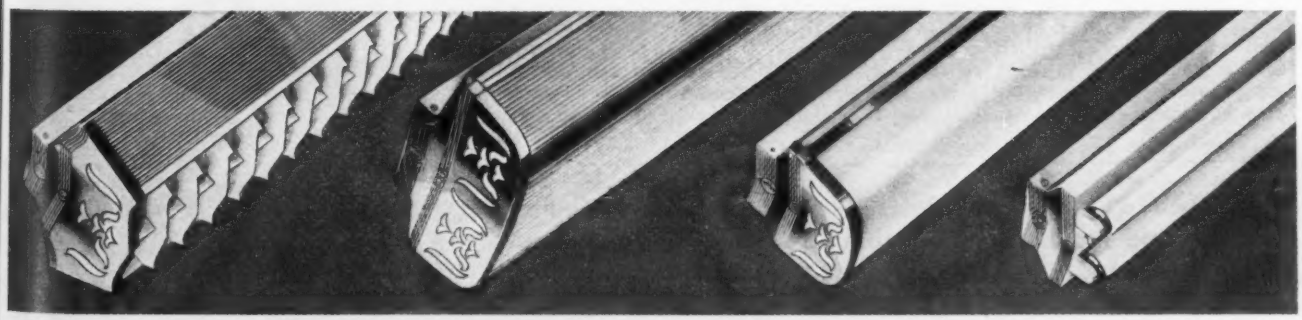
LIGHT-IN-LINE Commercial Lighting Fixtures actually offer MORE light for the money, or a given level of illumination for LESS investment! A strong statement? Yes—and you can prove it by study of the E.T.L. data sheets on the entire line. Efficiency is but ONE of four big advantages offered by LIGHT-IN-LINE. This unique design (sixteen beautiful fixture combinations, engineered on the basic-unit principle) permits of easy, one-man installation . . . provides for simple, facile maintenance . . . offers widely-varied lighting effects *economically*. Covers entire range of open, louvered, and enclosed dustproof lighting; *single or continuous—row;* flush or pendant mounting; 2-light and 4-light, 40-watt and 100-watt. Union-made and U.L.-approved.

GET ALL THE DETAILS ON LIGHT-IN-LINE!

WRITE TODAY for comprehensive descriptive material—including E.T.L. data sheets—on this smart, luxurious fluorescent line that offers installers and users every advantage, and has been field-proven in hundreds of various commercial applications. Wholesalers, address Department 1110

See Moe-Bridges Display at Booth 134, Int. Lighting Exp., Chicago, Nov. 3-7

Below: 2-light LIGHT-IN-LINE integrated design. Left to right: Louvershield, Glasshield, Plastishield, and the Base Strip used for all.



MOE-BRIDGES *Corporation* ★ ★ ★

SHEBOYGAN, WISCONSIN

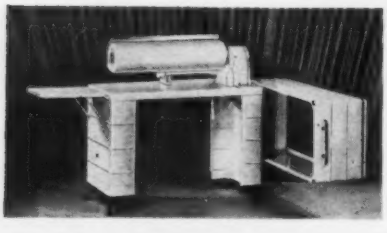
OVER 25 YEARS LEADERSHIP IN THE LIGHTING FIELD

APPLIANCE PREVIEW

Flat Iron (1022)

Proctor's Model 984 "roly-poly" Never-Lift iron has a single leg for stability and greater soleplate ironing surface; rights itself from a 60-degree angle. On this model, the handle latch, operating on a knuckle-press principle, makes the leg retract in a center groove in the soleplate, eliminating the hazard of catching edges in the work. The single leg and weighted base make the iron self-righting. The iron itself has been completely redesigned, new features including a double-compensating thermostat, and a rayon safety signal, which points to green when it is safe to iron rayons and nylons and red when iron is too hot for synthetic fabrics. The iron weighs 3½ lb.; has 10,000-cycle cord permanently attached.

Rotary Ironer (1023)



Blackstone Corp.'s Model 3N rotary-type ironer features a 26-in. roll in a specially designed utility cabinet. When not in use, the ironer is protected by a cover, called the Utilitop, which has a patented compound pivotal hinge permitting it to swing into position as a working surface. The ironer has scratch-proof shoe, double thermostats, switches for motor and heating elements and finger-tip and knee controls.

Broiler-Cooker (1024)

National Stamping & Electric Works has a portable broiler and cooker for a-c or d-c operation, 110 or 120 volts. It is made with open sides to permit inflow of air to the cooking area and has a hinged top cover to consume smoke, fumes and odors. Five-slot positions for the broiler pan control distance from heat. Underwriters' approved.

Small Range (1025)

Electromaster's Spacesaver deluxe model, recently introduced, is a 21-in. electric range equipped with a table-top lamp and an automatic timer clock for oven control. Requiring one-half the space of a full-size range, it has four cooking elements, including a deep-well cooker.

Twin-Bed Blanket (1026)

G-E is making a twin-bed electric blanket, with fabric width of 66 in., 6 in. less than the double-bed size. The new blanket has the automatic temperature control incorporated in the larger blanket.

Hot Plate (1027)

Edwin L. Wigand Co. is offering a new Chromalox double-unit hot plate, with regular range heating units and switches. Frame is one-piece, heavy-gage metal stamping, with acid-resisting white porcelain enamel finish. Both single- and double-unit hot plates are supplied for operation on either 118- or 236-volt current and with units rated at 1,200 or 2,000 watts.

Divided-Top Range (1028)

A divided-top electric range recently added to the Norge line is fully automatic, has two burners on one side of the top and one burner and a deep-well cooker on the other, with a center section free for work space. The oven has a glass door and is located in the middle with warming oven beneath and utensil storage space in cabinets on either side. New features include a safety switch on the rear panel and an automatic preheating device which raises oven temperature quickly, then switches off to allow other controls to hold the desired heat.

Desk Lamp (1029)

Faries Mfg. Co.'s new Model 20103 desk lamp was designed for use with the 32-watt 12-in. diameter fluorescent Circline bulb. It is equipped with a removable cigarette rest and ash tray. Over-all height is 17 in.; shade is 14x3 in.; base 7¼x2½ in. According to the announcement, it has a 90% or better power factor corrected ballast, radio condenser and manual starting switch; is supplied in rippled grey and chrome or electroplated statuary bronze.

ELECTRICAL WEST, 68 Post St., San Francisco 4, California
Please send me information about following CIRCLED items:

1022 1023 1024 1025 1026 1027 1028 1029

Name ..... Company* ..... Title* .....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

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SPORTS FLOODLIGHT TYPE L-69

1000/1500 watt

UTS MORE LIGHT ON THE FIELD
costs less to install
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THE MONTH IN BRIEF

Idaho Development

Dedication of Idaho Power Co.'s Upper Salmon plant on Sept. 26 marked completion of the first step in the company's expansion program, which contemplates addition of 185,000 kw. of generating capacity at five plants. Idaho Power last month virtually abandoned plans for a major hydroelectric development on the Snake River in eastern Oregon in favor of the site near Bliss, Idaho. While application for the Oregon site is still pending, state license tenure is an obstacle to the investment, and construction is being opposed by Secretary of the Interior Krug and others. Krug urged FPC denial of the license application on grounds that the proposed dam would conflict with department plans for river development.

Gas Attack

In an elaborate insert in color *Gas Age* magazine launched an attack upon the La Salle-General Electric sales training course on electric cookery. After quite a plea for fair dealing and denouncing false half truths, it employs some of the most elusive reasoning and distortions itself to try to soot up electric cooking as gas does pots and pans. A final flourish is an open letter to the La Salle people which tosses out several leading questions, each of which it answers trickily itself. Yes, as the last line of the letter says, "there's no fool like and old fuel."

Defaulting its Business?

Florida Power Co. has just done a surprising thing in its desperate power shortage plight. It is trying to sell off of its lines a long list of electric heaters that the public bought because it wanted electric heat but which that company hasn't enough energy to serve. California power utilities, strained to serve all the electric demand made on them too, are not defaulting on this responsibility. *Somehow* they are going to serve all who want electricity.

Colossal New Store

In Pasadena last month Bullocks opened a superbly beautiful new department store that employs every lighting technique developed by the lighting laboratories in a wide variety, some areas having as much as 15 watts per square foot in lighting alone. It is electrically heated too, but most always heat will have to be withdrawn. Its transformer vault has 3,000 kva. of transformer capacity (the downtown store in Los Angeles but 300).

PG and E Takes Navy Power

To supplement its power supply, Pacific Gas and Electric Co. has made an agreement with the Navy for purchase of surplus power from Mare Island's steam generating plant in northern California. Between 3,000 and 4,000 kw. will be available from the Navy plant in the daytime and from 8,000 to 10,000 kw. at night. Forced by unprecidented high loads and below normal rainfall to curtail surplus power deliveries to three heavy chemical plants (EWEST, September, p. 122), PG and E h been adding to its supply wherever it can, buying blo as small as 150 kw. from industrial power plants a other sources. Larger blocks are being purchased fr the Palo Alto Utility District and from Letterman G eral Hospital, San Francisco. Meanwhile, the chemi plants have been restored to 50% of normal power nee

More on House-Heating Rates

Following action of Seattle City Light (EWEST, A gust, p. 104), Puget Sound Power & Light Co. has as the State Department of Public Utilities for permiss to increase energy rates for house heating. Rate reques is 1.8 cents per kilowatt-hour above 1,200 kw. per mon This compares with the present 7-9 mills per kilow hour for other household uses in all-electric homes. Sim taneously the company proposed an optional commerc rate to become effective Oct. 6 and estimated to s small commercial users $45,000 annually. The propos house-heating rate would not apply to installations b fore Jan. 1, 1948, which would go under present sch ules until Jan. 1, 1952.

PUD Purchase Agency

Following the Washington Supreme Court decision t Skagit County might not act as fiscal agent for 15 PU seeking to buy Puget Sound Power & Light Co., the d tricts moved to set up a non-profit corporation as age The organization will try to buy the properties for the l million dollar figure previously set, and will then s piecemeal to individual districts, which will issue bon This procedure will cost the districts somewhat more th the original plan to have Skagit act for the group. O reason for this is that bonds would not be tax exempt.

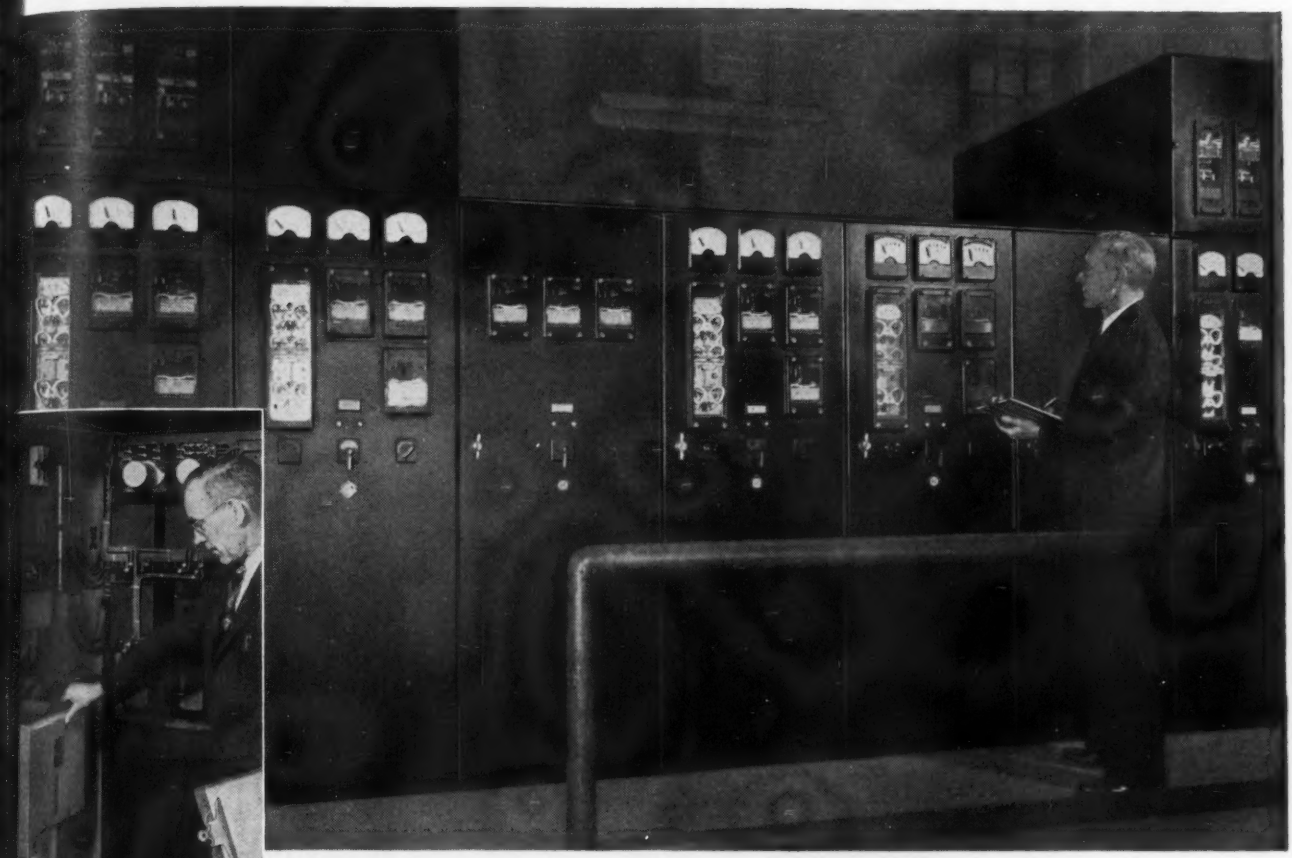
Steel Reduction Mill

A cold reduction mill with a capacity of more th 300,000 tons of sheet per year will be built in the L Angeles area by Columbia Steel, subsidiary of U.S. St it was announced last month by J. Lester Perry, Colu bia president. The plant is scheduled for completion the end of 1949 and will employ about 1,500.

Dedication of Differential Analyzer

Formal dedication and demonstration of a Gene Electric differential analyzer was made on the Los A geles campus of the University of California Sept. 2 This analyzer, which cuts time required in solving co plicated problems in design or analysis of engineeri problems, will be available to Western industry for a such problems they may wish to investigate. Ultimat the University will have available a complete computi center to include in addition an a-c network analyzer thermal analyzer, and a mechanical computing machi Several requests for use of the differential analyzer ha already been received from aircraft manufacturers, wh problems are particularly suited to use of the machi

RELIABLE METAL-CLAD SWITCHGEAR



Automatic disconnection of contacts, completely enclosed buses, mean safe and easy inspection of the breakers.

Pharmaceutical Firm Chooses "Ruptair" Circuit Breakers to Safeguard Electrical System

COMPLETELY RELIABLE electrical protection is *especially important* in manufacturing medical drugs. To get such protection, one of the nation's largest pharmaceutical firms brought its switchgear problem to A-C. The solution was *Ruptair* magnetic air circuit breakers integrated in Allis-Chalmers metal-clad switchgear. These units, with an interrupting capacity of 150,000 kva each, provide this plant with the complete electrical protection it requires.

* * * * *

It was Allis-Chalmers who first introduced metal-clad switchgear to the U.S. Today, it is Allis-Chalmers who offers one of the world's most complete lines of metal-clad switchgear for all applications. Bring your problems to experts . . . call our nearest office or write: ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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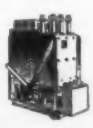
Allis-Chalmers Builds all four Types of Circuit Breakers

AIR BLAST available in interrupting capacities from 250,000 kva to 500,000 kva.

MAGNETIC AIR. A-C trademark *Ruptair*. Capacities: 50,000 to 250,000 kva.



OIL — A-C trademark *Ruptor*. Interrupting. Capacities: 50,000 to 500,000 kva.

LOW VOLTAGE—Metal enclosed dead front; 25,000-50,000 A. I. C., 600 v a-c max

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THIS MONTH'S NEWS

BPA GIVEN GO-AHEAD ON EMERGENCY PROJECTS

Under special authority of Secretar of the Interior J. A. Krug, Bonnevil Power Administration will resum work on 20 power transmission pro ects "of an emergency character an essential to continuous operations. The work will be financed by adjus ments in appropriated funds and b use of a $500,000 emergency revolvin fund set up in the original Bonnevil act.

Partly completed projects involve include The Dalles-Goldendale tran mission line at a cost of $133,000 an the Mossyrock-Morton line extensio in Washington at an approximate ou lay of $75,000. Smaller transmissio lines in Oregon and Washington als are included as well as various capit additions. Completion of a number o other projects will await additiona congressional appropriations. Contract to be covered under the emergency or der total $769,000.

Ross Dam Addition Urged By City Light Official

A $5,298,965 contract for construc tion of the third step of Ross Dam ha been recommended to the Seattle Boar of Public Works by Superintendent R. R. Hoffman. The negotiated contrac will be awarded to the General-Shea Morrison Co., now completing the sec ond step of the dam.

The third step, requiring two year for completion, will raise the dam 9 ft. above the second step to a height of 540 ft. above bedrock.

In urging the contract award, Hoff man pointed out that, even under the best of conditions, with uninterrupted work on Ross Dam, it will be at leas five years before City Light can carr its load without buying power. During the five-year period, City Light plans to spend $40,000,000 on plant expan sion. It will increase capacity at Georg power house and will build a 360,000 kw. power house at Ross Dam.

● WASHINGTON State's Attorney Gen eral Smith Troy has ruled that the city of Tacoma is bound to provid fishways over its hydroelectric dam on demand of the state director o fisheries.

ESSEX EXTRA-TEST MAGNET WIRE

Insures Multiple-Wound Coils

ALIKE as peas in a pod

Coil winding—particularly multiple (gang) layer-winding—demands wire uniformity to insure —

- **Coils of uniform size and resistance value.**
- **Maximum turns in available space.**
- **Freedom from broken wires, pile-ups, crossed turns, run-backs, spaced turns, and frequent tension adjustment.**

All of which means *better coils* plus *increased production.*

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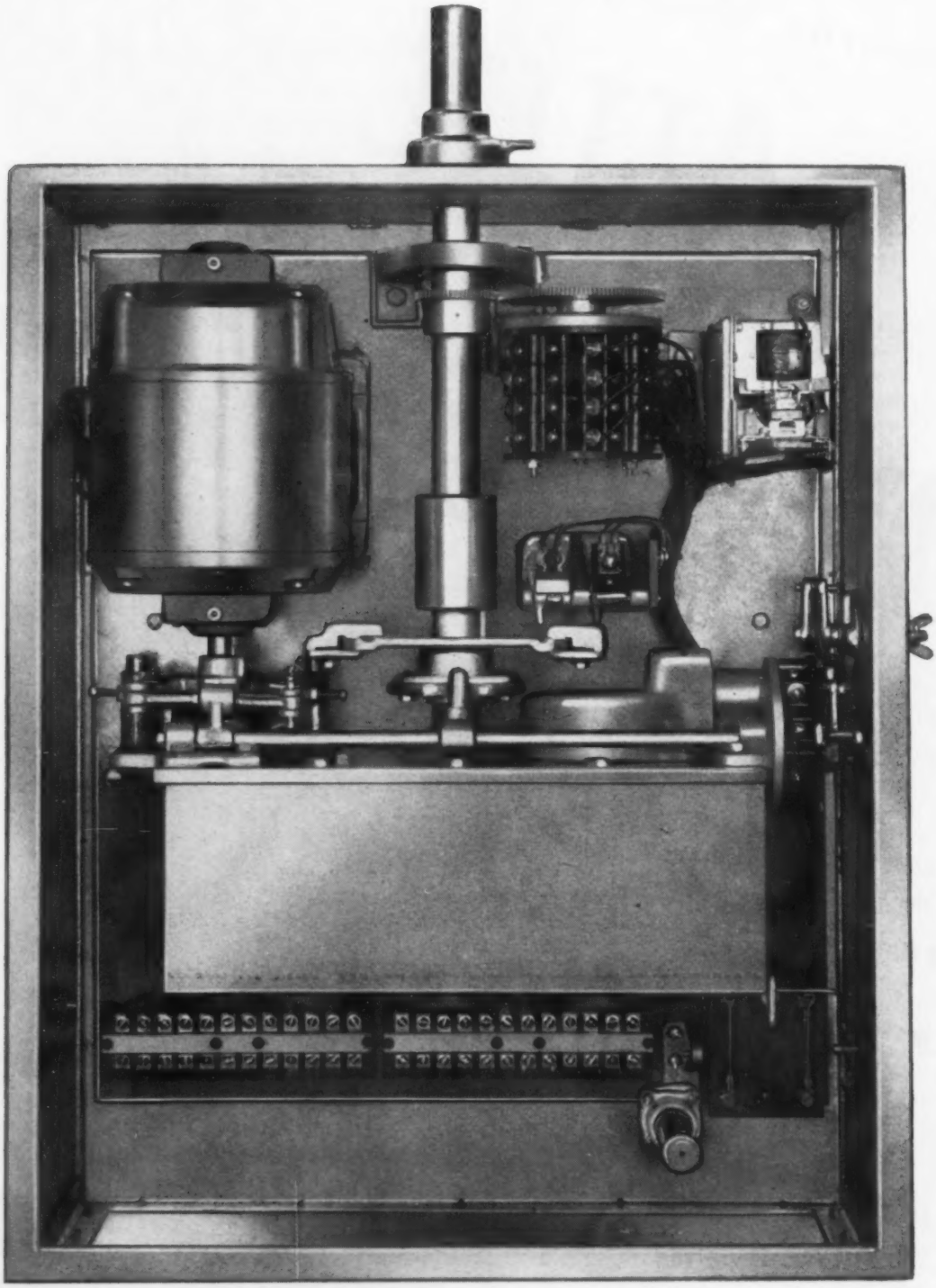

MOTOR MECHANISM
FOR OPERATING
DISCONNECTING SWITCHES
TYPE CG-1

WHILE WE DELAY—

Russia Drives for the Atlantic

IN THE STRUGGLE to keep western Europe west of the Iron Curtain it is later than you think. Unless the United States quickly mobilizes its own and other nations' resources, World War II will be lost as World War I was lost—by no economic follow-through.

Millions of people in western Europe, living in old homes or no homes at all, face another winter of near starvation. Some countries are absolutely without dollars to buy abroad the food and fuel they need for survival. Others slide toward that desperate state.

In this welter of misery Russia grasps for dominion over all Europe. Everywhere, as cold and hunger deepen and as men begin to doubt America's determination to help, Russia turns on the pressure. In France the Communists drive to overthrow the Government. In Italy they do likewise. In Greece Russia kills the United Nations investigating commission. In Trieste Tito elbows us out of the way. In Germany and Austria the Soviet commanders alternately stymie and flout the Allied governments.

FACED WITH this bloodless attack, the leaders of western Europe and of the United States have not covered themselves with glory.

Look, for example, at what the sixteen European countries participating in the Paris meetings on the Marshall "plan" first proposed to the United States as a catalog of their needs. In the main it was simply an adding up—to $30 billion—of what the various countries thought they needed to keep going in the same old way at the same old stands. There was no real start on plans for the mutual aid by European states which is the essence of a successful recovery program . . . no real start on plans to knock down the barriers which divide European trade into hopelessly inadequate little pockets . . . no real plans to clean up currencies which deteriorate so fast nobody wants to work for them. *In fact no plans to make people want to work.*

Meanwhile, what have our leaders offered? Not much more than one fine commencement speech by General Marshall, outlining a good idea, and a couple of carloads of statistics, with more to come.

Not even a beginning has been made on the most crucial part of any European aid program—*that of explaining to the American people what their part must be and why.* It is true that not all the reports of all the statistical committees have been completed. They never will be. But it is also true that the broad outlines of what the United States must do to save Europe are already clear. And it is not simply to provide more dollars, although $12 to $16 billion more—the cost of 6 or 8 weeks fighting in World War II—may be required.

A far more basic requirement is leadership which will lift Europe out of the slough of despair and get recovery rolling. Without that leadership more billions for Europe will buy us nothing but more bitterness and remorse on both sides of the Atlantic.

WHAT ARE the ingredients of that leadership? Here are a few:

1. A bi-partisan program for European recovery.

It should be so thoroughly understood and so overwhelmingly supported by both parties that playing politics with it will be like selling military secrets to the enemy.

Truman and Vandenberg have failed miserably to develop and explain a complete program—one in which Europe and America can have full confidence. Nor have Taft and Dewey and other candidates for high office pledged that politics will stop at our shoreline. These men must speak out. To date Herbert Hoover alone has had the courage and vision to state a program.

2. A mobilization of American food supplies.

We must assure people at home and abroad that our crops, cut down by drought and heat, will be stretched to cover minimum European needs (with whatever help we can muster from other nations) without forcing still higher food prices here.

Some food experts are comfortably confident that the stretching can be done. But

meatless and wheatless days, higher extraction of flour from wheat and similar voluntary conservation moves would make it surer. And they would demonstrate that a free country can mobilize itself to meet a very serious crisis.

3. An understanding that relief is one problem and recovery another.

Both problems must be solved. Relief emergencies must be met, some of them at once. But they must not black out the longer task of recovery. Italy illustrates the point. Italy, particularly the south, is flat broke. Help is needed right now to keep people from dying in the streets. But we must eventually do more than keep the Italian people alive. We must help them get back to useful work so that they can stand on their own feet.

4. A steady insistence on results—which means that Europe must find a way to make its people want to work.

In the U.S.S.R. they have a way to get things done. It is to liquidate those who do not work. In the U.S.A. we have a way to get things done. It is to create incentives to make people want to work. Western Europe, notably France and Britain, has fallen between two stools. It has socialized away the incentives, and it does not yet, thank heaven, enslave the laggards. We should make it crystal clear that we have no designs on the national "sovereignty" of others. But we should make it equally clear that we insist that those countries which receive our aid work hard enough to get results. To this end continued aid should be on an installment plan, each installment conditional on getting results. Otherwise more billions can easily disappear down the drain.

5. Insistence on all-out self-aid by European countries.

That is the constructive core of the Marshall idea—to help Europe to help itself. In his brilliant "Report on Germany" and how to get it "off the backs of the American taxpayer," Lewis H. Brown, Johns-Manville Chairman, shows how the export of only 10 million tons of coal a year from Britain to western Europe would speed industrial recovery of the Ruhr immeasurably. There are countless other cases where effort in one European country—or a group of countries—will break a big industrial bottleneck in another. We should insist that everything possible be done to see they are broken.

6. An agreement with Britain and France giving us authority in western Germany equal to our responsibility.

Britain is shifting to us most of the financial burden she has been carrying in the German occupation. Less directly we shall also be carrying much of the French occupation load too. We must have authority in the economic field commensurate with our responsibilities. Otherwise the management of western Germany can poison Anglo-American and Anglo-French relations in addition to wasting resources we could use to promote general European recovery.

It is truly said in the scriptures that the Lord loveth a cheerful giver. But it is not recorded anywhere that anyone, including the recipient, loves a soft-headed giver. Hence as a capstone any program of aid for Europe should have machinery assuring that only what is needed is sent; that what is sent does the job for which it is sent; and that arrangements are made for the recipients to pay back whatever they can.

THE AMERICAN PEOPLE should be told clearly by their leaders that there is no assurance that the best possible program of economic aid for Europe will do the job. The time is very late.

In France and Italy, as our help falters, the Communists right now are provoking strikes which will make the people's suffering more acute. They hope, of course, to overthrow the governments in both those countries and to seize control. If Communist dictatorships are clamped on France and Italy this fall, Russia and her satellites will have advanced to the Atlantic. The Iron Curtain will have moved 500 miles west—toward us.

Americans should be clearly told, therefore, that not to undertake an immediate program for the recovery of Europe is to bring closer the greatest possible national disaster—World War III.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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Display your machines prominently, and demonstrate them often.

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ASTRONOMIC DIAL "ON" and "OFF" operating arms are adjusted daily to sun time automatically. Follows changing seasons with uncanny accuracy, requiring no attention after being set when installed. Price—only $12.00 extra with any Standard 24-hr. Model Tork Switch. Write for complete bulletin on Astronomic Dials and other Tork Products.

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TELLURIDE POWER PLANS SYSTEM EXPANSION

Telluride Power Co. will spend more than $500,000 for extension of facilities in its south central Utah area in the immediate future, Paul P. Ashworth, general manager, announced. The project includes enlarging and extending the transmission and distribution systems, automatic voltage and line sectionalizing equipment and building of duplicate lines into major load centers.

Work is already under way on replacing small conductor wires with larger conductors on 44,000-volt lines in several sections of the region and construction was scheduled for mid-September on a new 34-mile heavy transmission trunk line from Richfield to Gunnison, looping into the new U. S. Gypsum Co. plant at Sigurd. A supplementary 44,000-volt trunk line will be built from Santaquin to Nephi for auxiliary service from the Northwest Power pool through the Utah Power & Light Co. system.

A 10,000-kw., 44,000-volt automatic regulating transformer has been ordered for installation at Nephi to stabilize transmission voltage on the entire power network.

Reclamation Official Asks Bill's Support

Plea for support of the Rockwell Bill (H.R. 2873) amending the federal reclamation act was made in Boise recently by Kenneth W. Markwell, assistant commissioner of reclamation, before an annual convention of the Association of Western Engineers. The convention demonstrated its approval of Markwell's stand by passing a resolution calling for enactment of the bill.

The Rockwell bill would decrease from 3 to 2½% the interest rate chargeable to power and municipal water aspects of reclamation projects and would ease certain other requirements concerning project feasibility.

It provides a formula for repaying the cost of a multi-purpose reclamation project from the power returns, and would authorize the Secretary of the Interior to re-examine existing projects to determine if any part of costs might be allocated to salinity or silt control or recreation.

● MORRISON-KNUDSEN has received a $13,900,000 contract for construction of the Reclamation Bureau's multiple-purpose Boysen Dam. Work will begin this fall on the project, to be located on the Big Horn River near Thermopolis, Wyoming. Included in the contract was the main dam structure and the hydroelectric power plant. The latter will be equipped with two 7,500-kw. generators, the full power capacity planned for the project. The Reclamation Bureau already has completed a 33-kv. transmission connecting with the bureau's Colorado-Wyoming system to supply energy for construction.

● CONSOLIDATED MINING & SMELTING Co. Ltd., has bought three of four power plants of the West Kootenay Power & Light Co. on the Kootenay River, B. C., R. E. Stavert, Consolidated president, reported. Total capacity of the three plants is 216,000 hp. Stavert explained that the purchase was made to co-ordinate the operation of the power plants with the operation of metallurgical and chemical plants of Consolidated at Tadanac and Warfield. Consolidated has for many years used the entire output of the three plants.

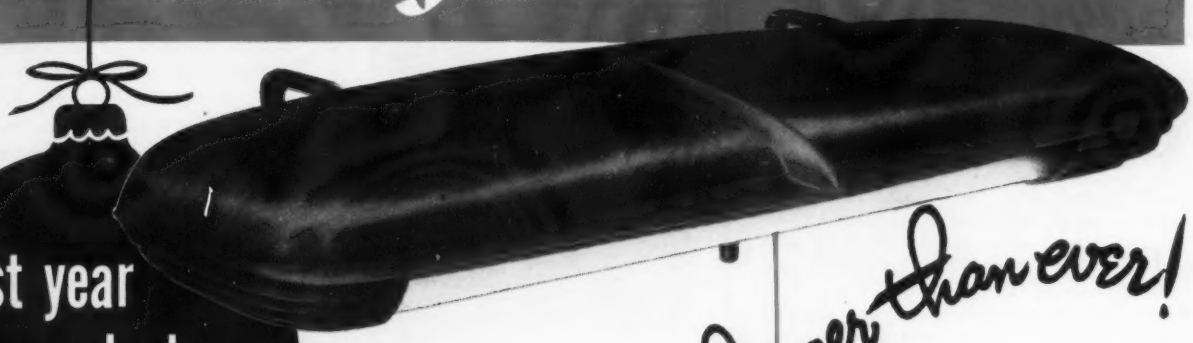
● TO PREVENT a power shut-off, the Arizona Corporation Commission last month granted Eloy Light & Power Co. an emergency rate increase, which in some instances will reach 95%. The Eloy company, which buys power from the Salt River Water Users Assn., asked the increase to compensate for higher power costs. The situation became critical when the Water Users cut off power pending payment of $67,000 owed them by the company. Power was restored after 24 hours, when farmers pooled $61,000 to pay the overdue bill.

● PLUMAS-SIERRA RURAL ELECTRIFICATION CO. will spend $10,000 to build 7½ miles of power line to serve seven customers in Red Rock, Nev., 75 miles north of Reno. The company has been granted a 25-year franchise by the commissioners of Washoe County. Future plans call for extension of the line 15 miles to serve 30 additional customers at Black Springs.

● IDAHO POWER CO. has applied to FPC for authority to issue 35,000 shares of preferred stock with a par value of $100 per share and of 100,000 shares of common stock, par value $20 a share. The money will be used for the company's construction and improvement program.

● GENERATING FACILITIES at Fort Huachuca, Ariz., inactivated Army base, have been leased to the Nogales Citizens' Utility Co. and will be used to supply power to the border city. The 1,800-kw. plant will make possible closing of the company's Nogales generators for repairs.

ELECTRO star·glo FLUORESCENT BED LAMP



last year it smashed sales records

This year it will be bigger than ever!

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Every installation that calls for automatic control calls for a Reliance Time Switch. Completely automatic . . . easy to install . . . proved through 35 years of dependable service . . . Reliance Time Switches provide added volume for contractors and better service for users. You can rely on the Reliance line. Ask your distributor or write Reliance Automatic Lighting Co., 1939 Mead Street, Racine, Wis.

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RELIANCE AUTOMATIC LIGHTING CO.

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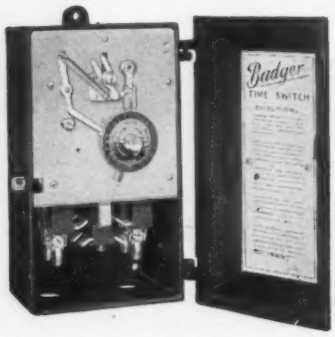

"Badger" Heavy Duty, Automatic Switches.

"Model-W" Synchronous Automatic Switch.

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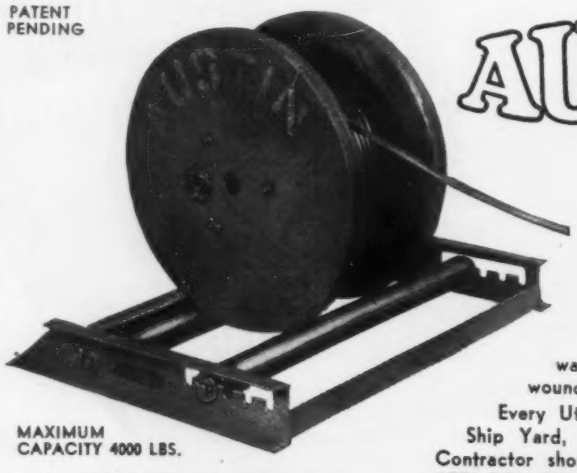

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NO. 600 REEL ROLLER

A new quick, easy, safe way to dispense any material wound on a reel.

Every Utility, R. E. A. Cooperative, Ship Yard, Railroad, Wholesaler and Contractor should have several AUSTIN REEL ROLLERS. When pulling one or more cables into conduit use an AUSTIN REEL ROLLER for each cable. Can be mounted stationary or used on the job as a portable device—ideal for service and repair trucks.

9 OUTSTANDING ADVANTAGES

(1) Ramp—makes it quick, easy and safe to load the reel.
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(3) Reel rolls on grease packed flanged ball bearings with the greatest of ease and safety. No backlash.
(4) Thumb screw, which when tightened, prevents roller from turning for easy and safe removal of reel.
(5) Leg screw hole in each corner for stationary mounting. Hole in each side for bolting rollers together.
(6) Heavy steel frame, painted bright orange, not only adds to its appearance, but, also, makes it readily visible on the floor which helps to eliminate accidents.
(7) Five adjustable slots to take various reel diameters. No screws, washers or cotter pins to remove—simply raise up the roller and slide into the slot required.
(8) Will take any reel up to 30" in width. For larger reels, use two reel rollers and bolt together end to end.
(9) Can be used in the warehouse, on the job or truck.

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COOPERATIVE PLAN FOR ARIZONA POWER LINES

Controversy in Arizona over distribution of Colorado River power last month resulted in announcement of a tentative cooperative plan with USBR and removal of Kenneth B. Aldrich as state power authority director.

Power Authority Chairman Michael J. Dougherty, announced a tentative agreement under which the USBR would build the main transmission lines of a state power grid and the authority would build the lower tension lines to markets not served on the main system.

Aldrich had maintained that the state should build the entire system under a program involving $30,000,000 in bonds. He stated that the government does not construct backbone lines at federal expense but merely advances funds which must be repaid. If the authority uses lines constructed by the bureau, it must pay for their use on a basis similar to that which would exist if the authority issues bonds and constructs the lines itself, Aldrich contended.

The working agreement with USBR reported by Dougherty included the following points:

1. The Bureau of Reclamation will build a "main line" transmission line from Hoover Dam, and from $47,000,000 Davis Dam now under construction, through the central valleys to southern Arizona.

2. The excess carrying capacity in the bureau lines will be made available for the use of the authority in moving both Hoover and Davis power into the state's markets.

3. The power authority will construct lower tension "feeder lines" to reach those markets not touched by the Reclamation Bureau's main system, as power demands justify.

4. The authority will buy all Davis Dam power the reclamation bureau will make available to it. Arizona's share of Hoover power already is fixed.

5. The authority will pool its Colorado power and make sales contracts, "without distinction to source or rate" with utilities, public bodies, agencies and cooperatives, making delivery at convenient points.

● PUBLIC SERVICE CO. of Colorado's new $500,000 South Terminal substation in South Denver went on the line Sept. 7 with 25,000 kw. additional capacity, increasing the potential for city and surburban service approximately 20%. The installation is one of the projects in the utility's 18 million dollar expansion and improvement program.

Engineers..!

Locke ENGINEERING Data No. 1

LOCKE INSULATOR CORPORATION · BALTIMORE, MD.

How Manufacturing Methods Affect the Design of Porcelain Insulators

PART I

The uses of porcelain insulators is restricted chiefly with the operating characteristics of the finished product. But the manufacturer. However the final product must be capable of being manufactured by practical methods, often highly mechanized, so both manufacturer and user must recognize both the range and limitations of making methods.

General Processes and Forming Methods

Several distinct methods or processes are used, all of which come under either the Wet Process or Dry Process classification. Although these methods will be described in detail in another chapter, a brief review of them is included here, since the method used is determined by the design and service requirements of the insulator.

These two general classifications are further broken down into specific forming methods each of which has its own limitations and advantages. Fig. 1 shows this information graphically, but the description which follows, although elementary, includes several pertinent comments on each method.

Plastic Wet Process

PLUGGING—Cylindrical, rectangular or oval blanks, either solid or hollow, are extruded and later turned to the desired shape.

PLASTER—Plastic clay is placed in a plaster of Paris mold, which forms the outer shape, and a rotating plunger is pressed into the clay to form the inner shape. As in the casting process described later, the plaster mold occupies an important place in the forming process because of its moisture absorbing characteristics.

JIGGERING—Plastic clay is placed in a plaster mold to form the outer shape, and a profile is used to form the inner shape. Relative rotation between mold and profile permits the profile to be gradually worked into the clay.

THROWING—Plastic clay is formed by hand on a potters wheel making a blank that is finished later to final shape.

It should be noted that, with the exception of jigging, all these methods result in products of revolution. The great majority of pugged pieces are also products of revolution.

Cast Wet Process

SLIP CASTING—In this process the outer shape is established by a plaster mold and the inner shape by a removable core. Liquid clay, known as slip, is then poured between them. The mold and core absorb water from the slip and are removed when the clay has attained sufficient rigidity.

DRAIN CASTING—No core is used, and the slip is left in the mold until the desired thickness of clay is deposited on the inside of the mold. The remaining slip is then drained out.

Dry Process or Dry Pressing

DRY PRESSING—Pulverized moist clay is formed to desired shape under high pressure in steel dies.

VACUUM DRY PRESSING—An improved method of dry pressing in which the clay and die have the

This is one of a series of Engineering Data folders that will be published periodically by the Locke Insulator Corporation. If you wish additional copies, or if any of your associates wishes a copy, just address a letter or postcard to Locke Insulator Corporation, P. O. Box 57, Baltimore 3, Maryland.

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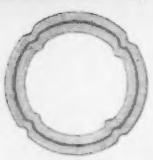

Cross Section Showing Indentations.

BRIEGEL METHOD TOOL CO.
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BM SYSTEM

USBR STUDYING POWER SITES IN CALIFORNIA

Bureau of Reclamation has initiated studies to determine the hydroelectric capacity of the Pine Flat project and additional power generation sites on the Kings River in southern California, R. B. Cozzens, Tulare Lake Basin district manager, announced.

The investigations will consider both the geological features of prospective sites and methods of producing maximum power without interfering with irrigation and flood control on the river.

Studies will be made by reclamation engineers immediately below the site of Pine Flat Dam upstream from Piedra, at the Wishon power house site on the north fork of the river and at Peart and Meyers Lake in the Dinkey Creek region.

Company Asks Permit to Abandon Hydro Plant

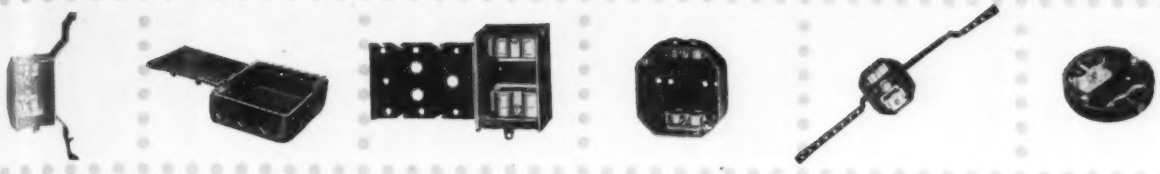
California Oregon Power Co. has applied to the California Public Utilities Commission for permission to remove its Shasta River hydroelectric plant in Siskiyou County.

The company explained that it has been unable to use the plant to generate power except in winter because so much water was being diverted from the river for irrigation. It had been used as a stand-by for Yreka and vicinity but was no longer necessary, the company said. The land and buildings would be sold; the equipment moved to the Oketee plant on the North Umpqua River in southern Oregon.

● On indication of Bureau of Reclamation spokesmen that the Anderson-Cottonwood Irrigation District may be able to get power from Shasta Dam, district officials have taken preliminary steps toward forming a public utility district. The bureau is making a study of contract plans which would result in the sale of power to the district, located about 30 miles from the dam.

● Bids were to be opened Oct. 15 for excavation of a 1,100-ft. diversion tunnel at Hungry Horse dam site in northwestern Montana. The tunnel will divert waters of the South Fork of the Flathead River approximately 30 miles northeast of Kalispell, Mont., during construction of the dam.

● An Agreement has been reached at Anchorage, Alaska, ending a seven-day strike of AFL city electricians. Electricians in most work categories received a 30-cent hourly increase.



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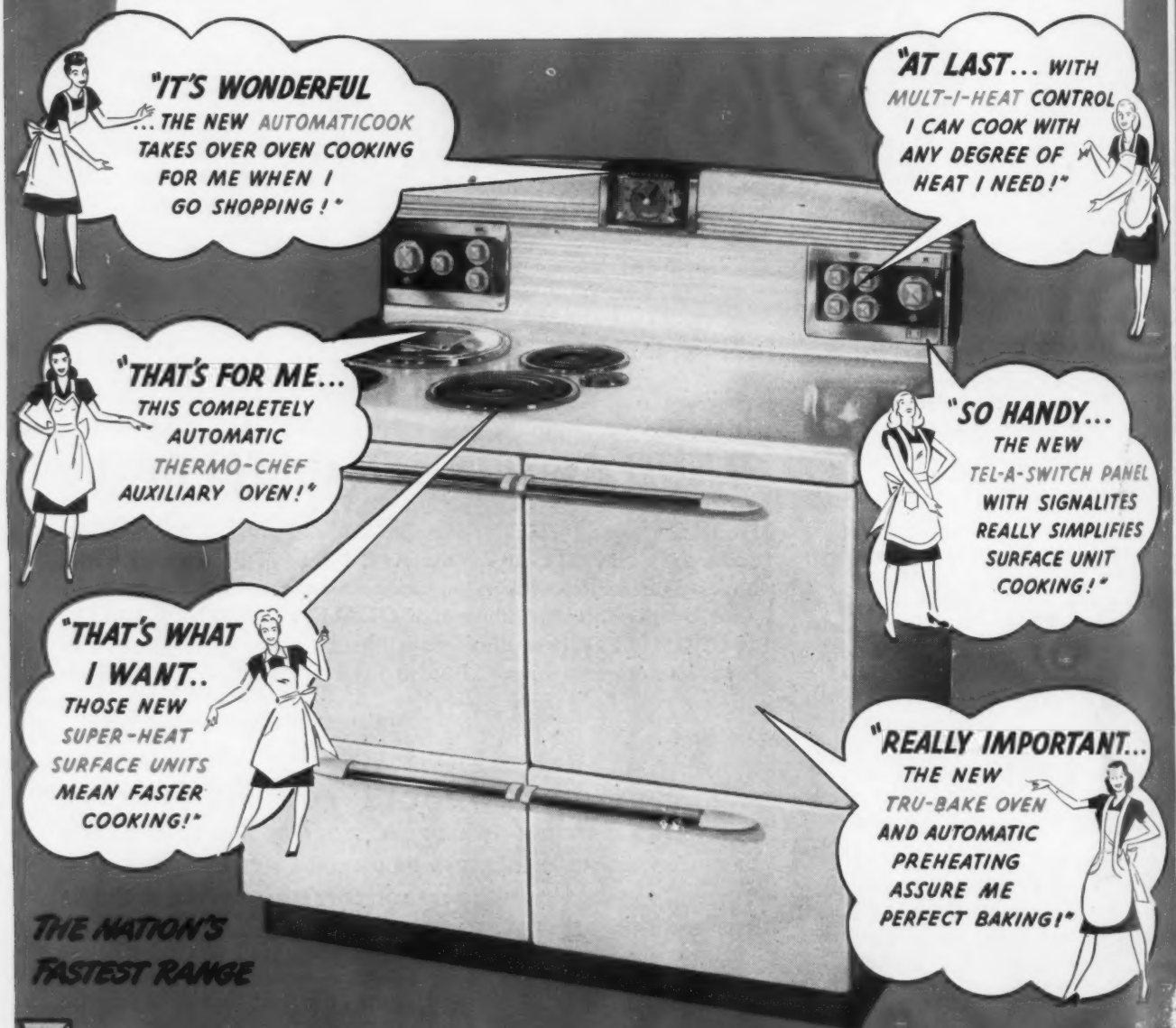
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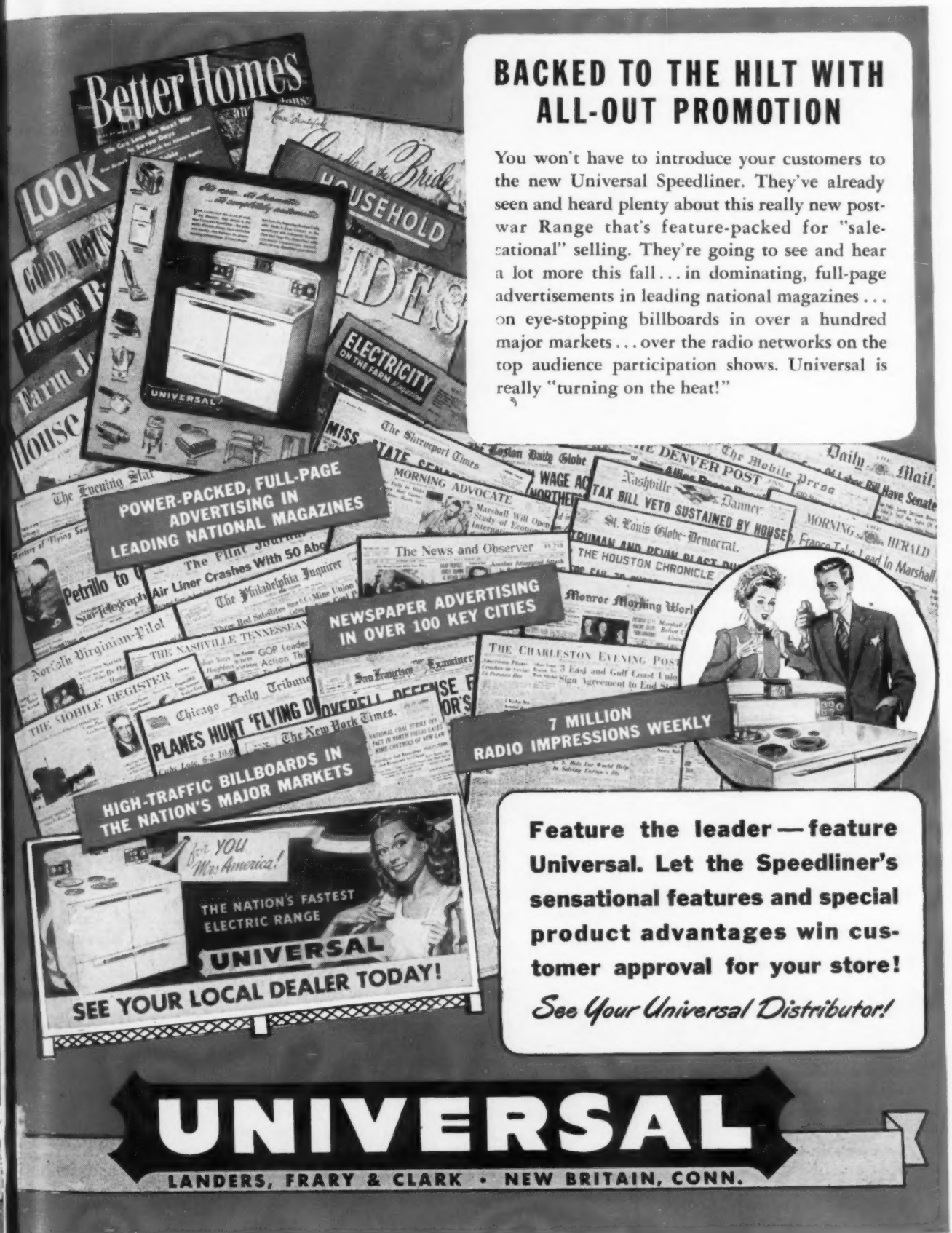
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PACIFIC FRANCHISE BID FILED IN PORTLAND

A 20-year franchise proposal, including revocable permit, has been filed with the Portland city council for Pacific Power & Light Co. Pacific, which has been merged with Northwestern Electric, is operating under an extended franchise first granted in 1913, and which expired last November. Commissioner Dorothy McCullough Lee, who filed the proposal, suggested that the franchise be submitted to the voters in May 1948, and that a revocable permit be granted in the meantime.

Under the proposed franchise, the city would have the right to purchase the system at any time, on six months' notice. Existing provisions that the company may neither sell its system nor buy properties without council consent are retained in the new franchise. The 30% gross revenue tax is also retained.

Colorado Company Requests Permit for Bond Issue

Southern Colorado Power Co. filed a request with the state public utilities commission Sept. 13 for permission to issue $1,600,000 in new bonds, and sell $250,000 in common stock. The proposed new financing is part of the power company's $3,000,000 program to extend present generating and distribution facilities, and install new substations in Pueblo, Fremont, Teller, Custer, Otero, Crowley and El Paso counties. Construction projects are already under way at several points in the system, notably at Rocky Ford where the indoor substation is overloaded.

Bonneville Will Wheel Tacoma Power to PUD

Bonneville will wheel Tacoma City Light power to the Mason County PUD No. 3, under a contract approved last month. The contract is the first in which BPA has agreed to carry outside power.

During the war, the district was served by Tacoma over a comparatively low-capacity line between Cushman power plant and Shelton. Recently, however, Tacoma has been faced with necessity of building a heavier line for increased service. Meanwhile Bonneville had built the first leg of a power line from Allyn to Shelton, and it is this line which will carry the Tacoma power.

Prevent loss of revenue and good will

NOTE: 7 Conductor Control Cable 19/#25 AWG—RoMarine Insulation with Individual Conductor Sheath of Neoprene — RoPrene (Neoprene) Sheath Overall—600 Volts.

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As best fits the requirements of your particular installation, Rome Control Cables are also available with other types of rubber insulations, as well as Rome Synthinol* thermoplastic compound. Outer jackets can be furnished as RoPrene (Neoprene), Rome Synthinol thermoplastic compound, or when desired the more conventional lead sheath or fibrous braid. If you have a problem involving the selection and installation of Control and Signal Cable, Rome engineers can help you. They will welcome the chance to work with you. Write Rome Cable Corporation, Rome, New York, or phone your nearest Rome Cable office. Ask for your copy of Specifications CRM-1 and CT-1.

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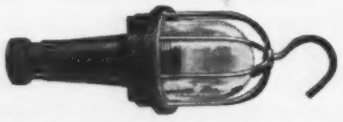
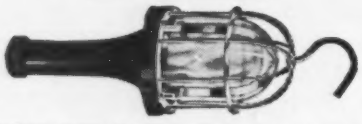
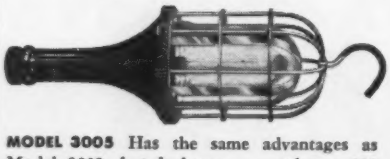
MODEL 3007 Entirely free from exposed metal. Strong cage is made of warp-proof fiber. Rubber gasket asbsorbs shocks.



MODEL 3006 Like Model 3007, it has a rubber shock absorbing gasket. Cage is heavily tinned and riveted.



MODEL 3002 Features a heavy brass cage, designed to prevent sparks. Shock - proof. Takes a 60 watt bulb.



MODEL 3005 Has the same advantages as Model 3002, but is larger . . . takes a 100 watt bulb. ALL McGILL GUARDS are heat resistant.

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CARRIER CURRENT SYSTEM INSTALLED BY PACIFIC

Installation of a new carrier current communication system between key power dispatching points has been completed by the Pacific Power & Light Co.

The new equipment, in common with other types of carrier current systems, uses power transmission circuits in place of regular telephone lines, and will supplement an earlier type system in use on the Pacific system for a number of years. The old equipment was of the amplitude modulation type. This has now been replaced with what is known as the single-side-band system.

Power dispatchers use the new carrier current telephone to control the flow of power around the Pacific system as needed to meet load demands. The system connects the Portland power control center with that at Pasco, Wash., and also runs to dispatching headquarters of the Washington Water Power Co. at Spokane.

● FRANKLIN County PUD of Pasco, Wash., has received only one bid for purchase of district bonds for acquisition of private utility properties in the county. Ballard, Hassett & Co. submitted a bid which would yield the PUD $1,459,425 in cash on bonds with a face value of $1,525,000. The effective interest rate would be 3.24%, slightly higher than other recent PUD bond offerings. The district proposes to buy the Franklin County property of Pacific Power & Light Co., valued at $1,200,000 by a superior court jury.

● PURCHASE by the Washington Water Power Co. of the Pierce Light & Power Co., serving the town of Pierce in northern Idaho, has been approved by the Idaho Public Utilities Commission. Sale price was $26,500. Pierce Light & Power Co. was a partnership composed of Galen and Ethel M. Burkhardt. The Pierce city council has passed an ordinance granting Washington Water Power a franchise and use of city streets and alleys for 25 years.

● MILITARY CONTROL at Hanford Engineer Works, Richland, Wash., ended Sept. 1 with the replacement of Lt. Col. Frederick J. Clarke by Clareton Shugg, formerly general manager for the Todd Shipyards Corp., New York. Change was in line with the Atomic Energy Commission's policy to place civilians in charge of all its operations, David E. Lilienthal, chairman, said.

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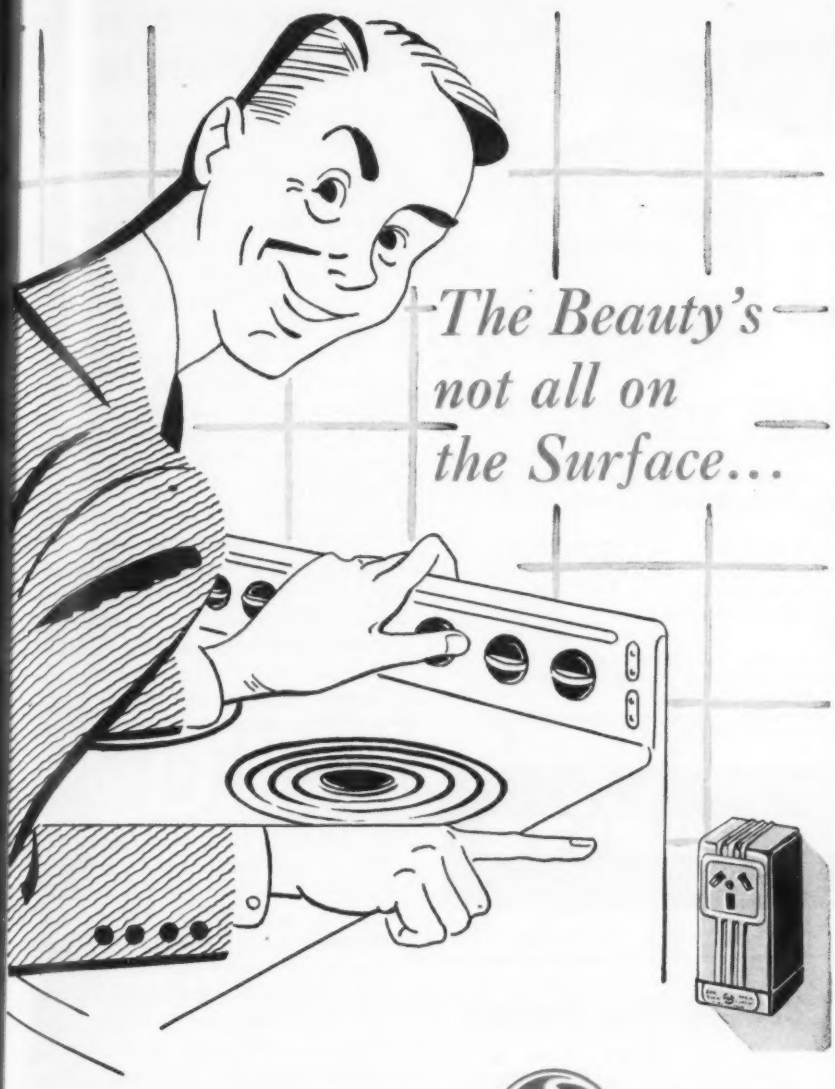

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It's the smart exterior that makes it easy to sell your customers. One glance at this good-looking outlet and the mention of General Electric, and they go for it. But, be sure to convince yourself, too. Look at the easy-working, solderless connections. Notice that you can lead in from bottom or rear. Look at the easy-action knockouts and the provisions for fourth-wire ground. You'll agree that it's a beauty, too. Its number is GE3000. Its name is General Electric — the name that convinces your customers — the name that makes your jobs easier.

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Wiring Briefs from your G-E Distributors

Do you know the interesting features that help make General Electric wiring devices easy to use and safe to specify? Do you know the wide variety of items in this full line? For useful facts and interesting bits of information, keep posted on this column. It's designed to help you learn more about the General Electric line.

Remember the stories about the *little man* who turns off the light in the refrigerator? The one about General Electric Watch Dog* fluorescent starters is even better, because it's true. Here's part of the story: a Watch Dog starts a lamp just like any other high-quality starter. But, once it's in operation, it stands guard, watching for any indication of lamp flicker. When a lamp starts to flicker, the Watch Dog starter turns it out — saves circuits and ballasts, outlasts other starters 5 to 1. For the rest of the story, ask any General Electric merchandise distributor.

Brutal is the word for most methods of hanging clocks and fans. But General Electric clock and fan hangers end all that. They're flush hangers that support fans and clocks with no extra work or damage to walls. Fan hanger outlet fastens readily to fixture stud in outlet box for sturdy support. Handy clip on plate of clock hanger outlet gives invisible support to wall clocks.

Surface wiring used to be the ugly stepchild, but you'll be surprised at how neat and good-looking it's grown. Convince yourself with General Electric's new folder on surface wiring devices. For your free copy, write to Section D73-1025, General Electric Company, Bridgeport 2, Conn.

*Trade-mark Reg. U. S. Pat. Off.

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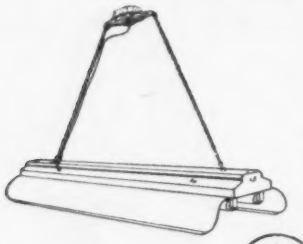
HANG CHAIN SUSPENSION FIXTURES IN A FEW MINUTES

WITH HYDEE HANGER*



Just connect wires — screw to outlet box. No centering, punching, drilling. No tools except a screwdriver.

Complete with receptacle, two 5-foot chains, "S" hooks and cord clips. Self-grounding — you can use 2-wire cord and plug. Fits standard 4" or 3¼" outlet box or plaster ring. $1.65 each list

Day-Brite Lighting, Inc., 5412 Bulwer Ave., St. Louis 7, Mo. Nationally distributed through leading electrical supply houses.

In Canada: address all inquiries to Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

*Patent No. D-141024, others pending. Underwriters approved

IT'S EASY TO SEE WHEN IT'S DAY-BRITE Lighting

ALL the strength and durability inherent in steel are combined---with definite economies---in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE INDIANA

Built-up Mica Products
for every
Electric Insulating Use

Sheets, Tubes, Punched and Molded Pieces, Mica Molding Plate, Mica Segment Plate, Flexible Mica Plate, Mica Heater Plate, Mica Tubing, Fiberglas and Mica, Segments, Mica Cloth, Y-26 High Heat Mica Plate, Mica Paper.

Manufactured By
NEW ENGLAND MICA COMPANY, INC.

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Send for Descriptive Folder

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ELECTRICAL SPECIALTY CO.

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SCHOLARSHIPS TO RECRUIT MEN FOR POWER FIELD

Outstanding sophomore and juni students of electrical engineering Oregon State College will be offer summer job scholarships in 1948, u der a plan worked out between t college and Portland General Electr Co. and designed to stimulate stude interest in choosing electric utili work as a career.

During the summer vacation ju ended PGE employed six student e gineers to test features of the schola ship plan and the results, accordi to James H. Polhemus, PGE presiden were "highly satisfactory."

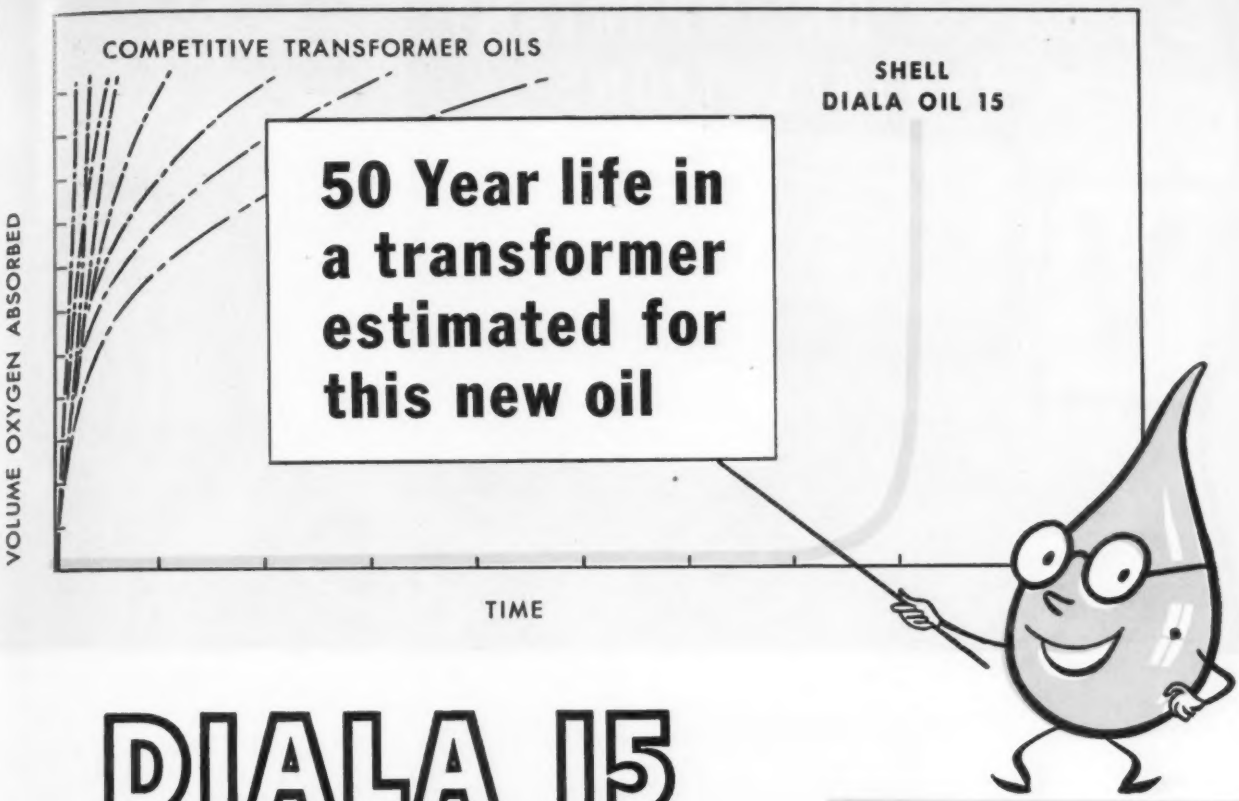
Objective of the company in spo soring the scholarship plan, Polhem stated, is to attract a higher proporti of electrical engineering students in the power field. The rapid progress electronics and related fields durin the last war has caused a dispropo tionate number of present students t major in them, a situation which ma cause a future shortage of powe specialists.

● AN ATTACK on an Arizona Corpora tion Commission order requiring th Tucson Gas, Electric Light and Powe Co. to provide service to the 11t Naval District and two other applicant has been filed by the company in Mari copa County Superior Court. The Cit of Tucson recently brought condemna tion proceedings against the company which seeks to void the commissio order on grounds that a ruling of th U.S. Circuit Court of Appeals allow no compensation for additions mad after condemnation is started.

● SAN DIEGO Gas and Electric Co.' 1946 annual report has been judged the best of the southwest public utility industry by the *Financial World* maga zine's Annual Report Survey. Presenta tion of the bronze trophy was made t Forrest M. Raymond, advertising man ager of the company, at a banquet in New York Oct. 10.

● FOR AN OUTSTANDING JOB in inter preting the American way of life in its advertising, Idaho Power Co. was given an award by the Advertising Association of the West. G. L. Stanton is the company's director of advertis ing and public relations.

● ECONOMIC BASE for Power Mar kets in Sanders County, Mont., has been published by Bonneville as the twenty-third in its series. Copies may be secured from BPA in Portland or Spokane.



DIALA 15

Resists oxidation in accelerated tests 140 times longer than next best transformer oil

For three solid years Shell chemists sought a transformer oil sufficiently oxidation-stable to overcome sludging—worst enemy of this type of coolant. Shell Diala Oil 15 is the result—an achievement that *far surpasses* the original goal.

For, so unprecedented is its oxidation resistance that—judging by accelerated tests—Diala 15 can last 50 years in a transformer!

Moreover, Diala 15 proved less damaging than ordinary oils to linen and cotton insulating fabrics. It has excellent thermal transfer properties and insulating value . . . low pour point . . . minimum volatility. And it's equally dependable for protecting oil-filled switches and oil-insulated cables.

Here's what the chart shows

In order to compare oxidation resistance of Shell Diala Oil 15 with other new and reclaimed oils, a special machine was developed to measure the amount of oxygen absorbed under selected temperatures. The above chart of the test shows that the best competitive oil absorbs oxygen 140 times as fast as does Diala Oil 15. On the basis of this accelerated test, it is estimated that the life of Diala Oil 15 in a transformer could be 50 years.

CALL THE SHELL LUBRICATION EXPERT AS THE FIRST STEP TO THE RIGHT SOLUTION OF ANY LUBRICATION PROBLEM

SHELL DIALA OIL 15

SHELL®

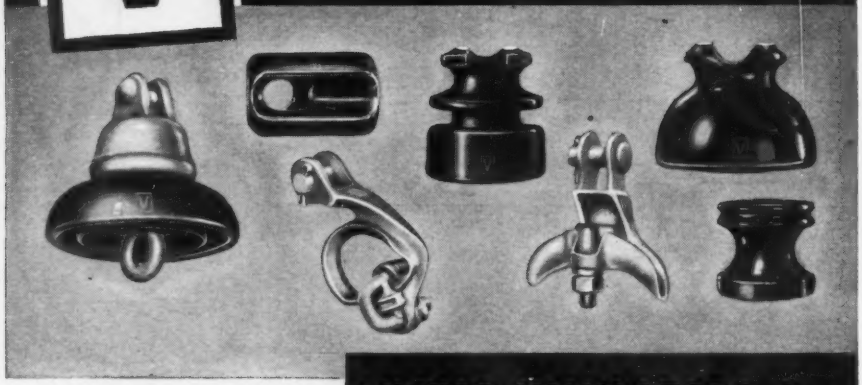
Specified ON IMPORTANT INSTALLATIONS···

Impressed on Each Piece of Victor Porcelain THIS SYMBOL OF QUALITY

V

• High tension porcelain insulators made at Victor have passed the most severe tests on various types of installations during the past 50 years. For safety, long service and satisfaction in high voltage insulators, look to Victor.

THE MARK OF ENDURING SERVICE



BIRTHPLACE OF FIRST WET PROCESS HIGH-VOLTAGE INSULATORS

VICTOR INSULATORS, Inc.
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ECONOMICAL

Jeffries Transformers

Reasonable in Price
Reliable in Performance

Jeffries large transformers are priced reasonably—and you can save their first cost in a short time by minimizing current losses. When you use a Jeffries transformer, you can provide voltage change at the point desired, without prohibitive expense.

We supply all types and sizes. If not in stock, we build to order in a hurry—a week to 10 days.

Write today for catalog

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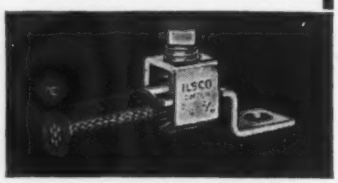
ILSCO
LUGS AND CONNECTORS

A Strong Point To Remember

THE COLLAR SECTION OF ILSCO CONNECTORS CANNOT SPREAD APART because precision-fabricated from drawn seamless copper tubing. MORE THREADS gained through the deep boss. Serrations in collar and tang provide added strength against pull-out.

Write TODAY for 48 page illustrated catalog showing connectors, soldering and solderless lugs, fuse clips, etc.



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NEWS ABOUT PEOPLE

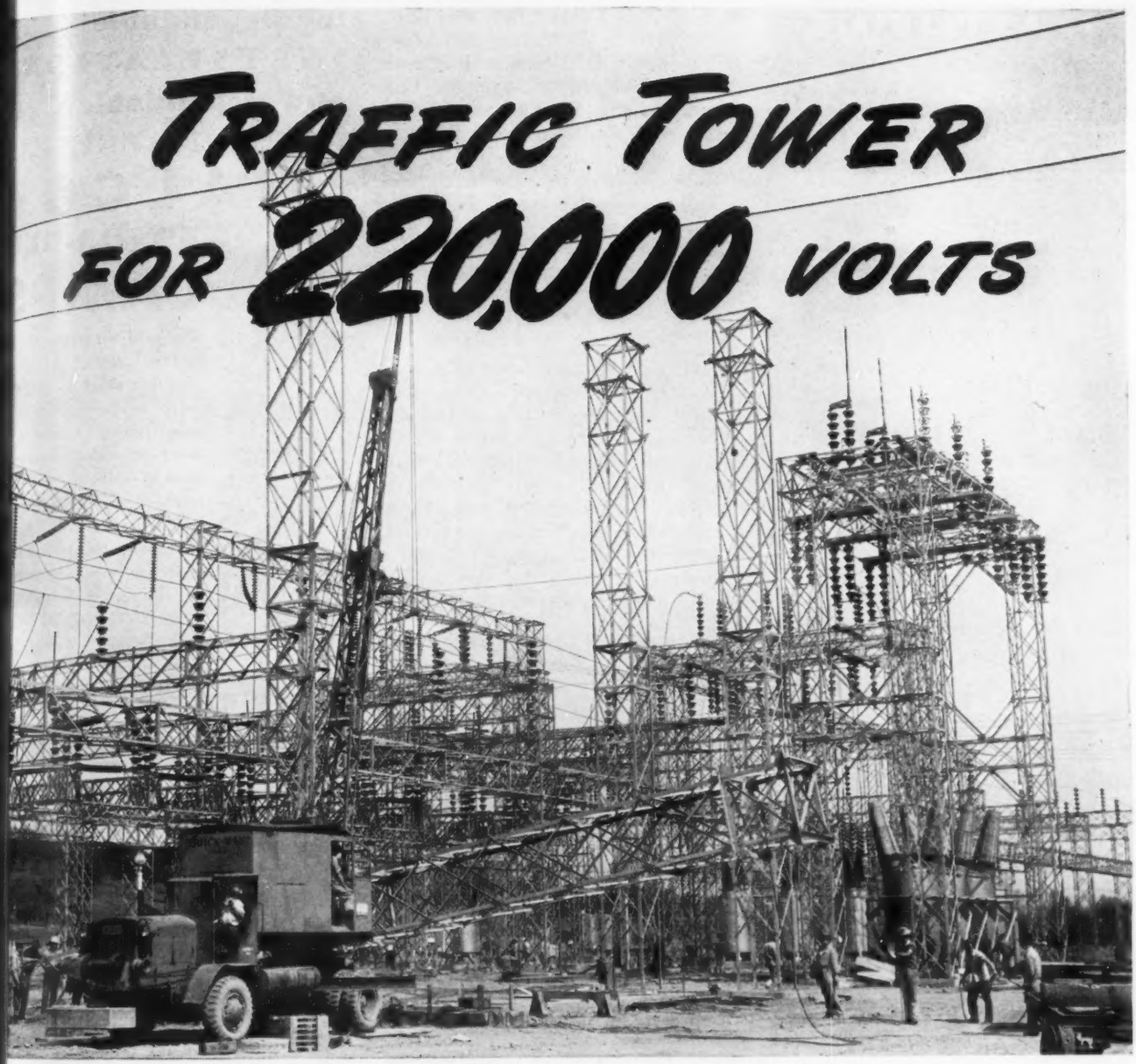
Hunt

● LLOYD F. HUNT, chief electrical engineer for the Southern California Edison Co., has been appointed one of the United States representatives to the Biennial International Conference on Large Electric High-Tension Systems to be held in Paris in 1948. As a member of the high-tension switching, circuit breakers and relaying committee, Hunt will appoint the United States advisory members for his committee and will aid in the contribution of technical papers on the general subject of switching and relaying. He is well known for his highly important electrical developments, having about forty inventions to his credit. His published articles on various practical and theoretical subjects have attracted international attention. In 1940 he received the national "Modern Pioneer" award for his contributions toward increasing the quality of electric utility service.

● EFFECTIVE Sept. 1, L. O. FRYER took over the position as district operating manager for the Central Pacific district of Graybar Electric Co. Fryer, formerly operating manager in San Francisco and for several years at the New York office, has made his headquarters in San Francisco.

● BRUCE O. WATKINS, former Westerner, has been named construction and maintenance equipment engineer for the A. B. Chance Co. Watkins is a graduate of the University of Arizona and formerly worked on REA projects in Arizona.

TRAFFIC TOWER FOR 220,000 VOLTS



Pacific Gas and Electric switching station north of Red Bluff, Calif. Steel for this job was fabricated at Bethlehem Pacific's tower shop, South San Francisco.

The steel structure shown here will provide switching facilities for distributing the electric power fed in from Shasta Dam and the Pit River power plants of Pacific Gas and Electric. It will carry a double bus of 3 sections with disconnect switches and circuit breakers to handle 12 incoming and outgoing power lines.

Steel used here was supplied by Bethlehem Pacific, an old hand at the job of fabricating transmission towers and allied structures.

Bethlehem Pacific is set up to design, test and fabricate steel on any scale for the western power industry. It operates mills at South San Francisco, Los Angeles, Seattle, closely coordinated with its fabricating shops at South San Francisco, Alameda, Los Angeles.

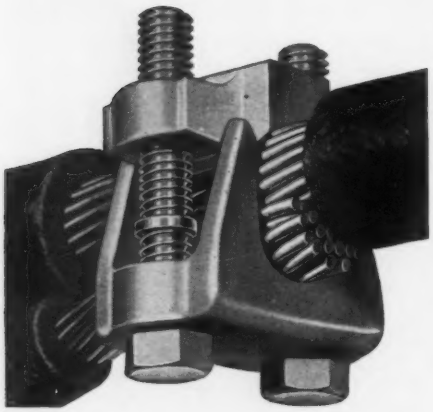
BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu

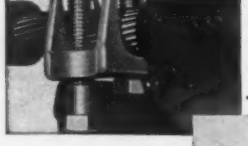
★ BETHLEHEM STEEL ★

BETHLEHEM PACIFIC

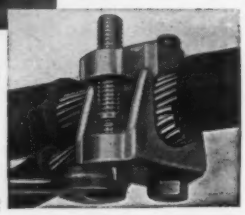
MATTHEWS UNICLAMP CONNECTORS



Made for use on copper or aluminum wires from 2/0 to 1000 MCM inclusive. They will connect two wires of their rated size or one wire of their rated size with one or more smaller tap-off wires down to No. 8 solid. They have many advantages over the larger sizes of connectors of the split bolt and other designs as they provide greater pressure between wires, hence greater holding power, are less costly, are easier to install and the assembled design is such that parts cannot become separated.



Fit on conductor as shown. Position top member and partially thread in free bolt.



Insert tap wire and equally draw up both bolts.

Write for Bulletin 206

W. N. MATTHEWS CORP.
3722 FOREST PARK BLVD.
ST. LOUIS 8, MO.

● GEORGE C. TENNEY, publisher-editor of ELECTRICAL WEST, has been named acting editor of *Electrical World*, in addition to his duties with the California company. RALPH FLYNN former eastern representative for ELECTRICAL WEST, who joined the editorial staff of that magazine in 1930, is the new publisher of the McGraw-Hill electrical group which includes *Electrical World*, *Electrical Construction and Maintenance* and *Electrical Wholesaling*. The appointments followed resignation of Lee Hill.

● RECENT APPOINTMENT of J. B. SHAMEL as commissioner of the building and safety department of Los Angeles was announced by Mayor Fletcher Bowron. For the past 24 years Shamel has been connected with the electrical contracting business. He is president of the California Electric Construction Co., Los Angeles, and a member of the board of directors of the Los Angeles chapter, NECA.

Shamel

● CLIFF JOHNS was recently named assistant superintendent of light and power for Puget Sound Power & Light Co.'s western division at Bremerton. Formerly local manager for Kirkland and Bellevue, Johns succeeds HOWARD CARTER, who was appointed division superintendent. Other changes in the company include the transfer of RALPH BROWN to the Kirkland office, and BOB RICHARDS to the Snoqualmie post. JIM POLLARD became assistant to the suburban manager at Seattle. FRED RAUCH was appointed supervisor of the Rainier office in Seattle to succeed MARLOW PARRETT, who was shifted to the Burien office. CHARLES HUNTLEY was named assistant superintendent of steam heat. FRANK SWEARINGEN was appointed advertising director; WILLARD HILLIER became chief clerk in the billing department.

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NALCO INFRA-RED LAMPS

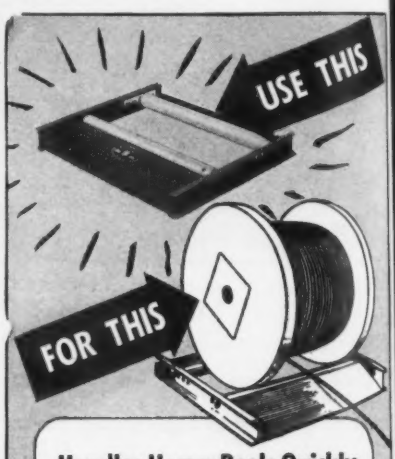
Nalco Infra-Red Lamps may be had in either inside silvered (self reflecting) or clear glass type (for use with reflectors).

Designed especially for industrial use, time tested and job tried — NALCO Infra-red Lamps with their long lasting carbon filament and sealed, reinforced base give installations that are enduring and dependable. This in turn assures the dealer that he can depend on a steady stream of reorders from satisfied users. Stock NALCO Infra-Red Dritherm Lamps for more industrial business.

See your Electrical Wholesaler

NALCO INFRA-RED DRITHERM
NORTH AMERICAN *Electric Lamp Co.*

1036 Tyler St. St. Louis 6, Mo.



Handles Heavy Reels Quickly . . . Safely . . . Economically

Saves time and money in the plant, warehouse or on the job.

Roll-A-Reel is the ideal way to reel or unreel wire, cable, or rope and does an easier, better job in every way.

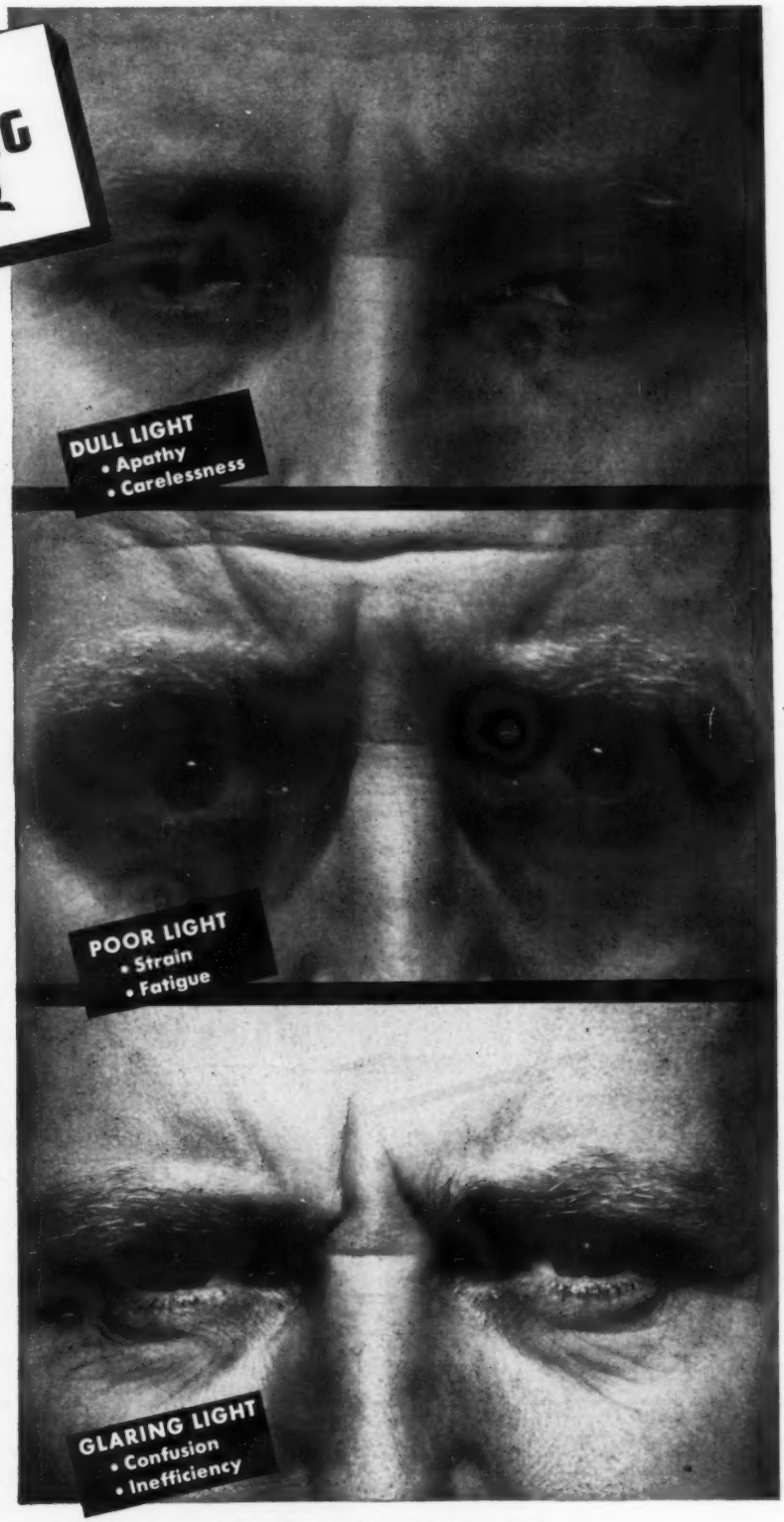
In two sizes . . . 2000 lbs. capacity—$37.50 and 4000 lbs. capacity — $75.00 F.O.B. Cincinnati.

Send for descriptive pamphlet.

ROLL-A-REEL
327 WEST FOURTH STREET
CINCINNATI 2, OHIO

COLOR ENGINEERING *pays*

How many eyes see how well in your plant?



Color Engineering corrects causes of carelessness, fatigue, inefficiency — cuts accident incidence — increases morale and productivity

Make it easy for your employees to work well! They'll respond. Surround them with colors, scientifically selected to ease eye-strain, relax nerves, encourage steady, all-day productivity.

Procedure? Call in a trained Fuller representative. He will survey your plant —building, equipment, production plan— and report *in writing*. Every detail of Fuller's recommendation will be fitted to your particular need. No obligation at all!

Color Engineering by Fuller helps efficiency by painting *out* dreary, fatiguing monotony —painting *in* relaxing colors that up morale and down the costs of carelessness and production delays. Plants all over the West "wouldn't go back to the old color*less* scheme." W. P. Fuller & Co. San Francisco. Branches and Dealers throughout the West.

FREE: 24-page book, "Color Engineering by Fuller." Full text, full-color photos, charts, safety symbols. Profitable ideas in every paragraph. Ask for it.

FULLER FINISHES

A MERCOID
UNFAILING ADVANTAGE

Whatever your control requirements may be, it is conceded that the switch in a control warrants first consideration, due to its functional characteristics. All Mercoid Controls are equipped exclusively with hermetically sealed mercury switches of special design and selected materials.

Mercoid mercury switches are known the world over for their dependable service. They are not affected by dust, dirt or corrosion; nor are they subject to open arcing with its attendant consequences of pitting, sticking or oxidized contact surfaces, all of which, are likely to interfere with normal switch operation.

That is why among other things, Mercoid Controls on the whole give you assurance of better control performance and longer control life—a distinct and unfailing advantage—the reason why they are also the choice of America's leading engineers for many important industrial applications.

MERCOID CONTROLS are available in a variety of types for sensitive control of Pressure, Temperature and Lever actuation.

MERCOID
APPROVED CONTROLS

THE MERCOID CORPORATION
4201 BELMONT AVENUE • CHICAGO, ILLINOIS

● RETIREMENT of H. F. FAULKNER, with Seattle City Light since 1936, as Ross Dam resident engineer and appointment of C. E. Shevling to the post was announced last month. Faulkner retired once before, in 1940, after reaching the mandatory retirement age of 65, but was called back in 1943 to be resident engineer for the second step of Ross Dam. He has been aiding in construction of City Light dams since 1927 when, while in the city engineering department, he was placed in charge of concrete control for Diablo Dam. Faulkner also was engineer in charge of concrete control on the first step of Ross Dam. Shevling will be assisted at Ross Dam by ROBERT P. SONNTAG, who moves up from office engineer. HENRY M. LEES has been appointed concrete technician.

● EMORY C. BRANCH assumed his new duties Oct. 1 as city manager of Reno for a four-year term. Branch was one of 33 applicants. Formerly commercial and industrial sales director of Puget Sound Power & Light Co., Branch has worked for the company in the Seattle area for 18 years. In addition he is chairman of the Northwest Chapter, IES.

● LEE H. POPE has been appointed manager of the Central Arizona Light and Power Co.'s newly organized central division which takes in the Phoenix metropolitan and suburban areas. In addition to his duties as division manager, Poe also will serve as district manager for Phoenix. He formerly was superintendent of the electrical department.

● ANNOUNCEMENT was made recently of the appointment of BERT M. J. CONLIN as Oakland branch appliance manager of the Westinghouse Electric Supply Co., succeeding the late Mowry Irwin. Conlin joined Wesco, Oakland, in 1945 as a salesman.

● FRANK W. LOOMIS, veteran illuminating engineer of Los Angeles, died last month. After his retirement from the illuminating engineering staff of Los Angeles Department of Water & Power in 1939, he was on the faculty of the Los Angeles School of Optometry. Some years ago he was with the then Hygrade-Sylvania Corp. He was a member of IES since its formation in 1906.

● HAROLD J. RICE, 66, died Sept. 10, at Los Angeles. He was electrical engineer with the Los Angeles Bureau of Power and Light.

Be Prepared . . .
DON'T RUN OUT OF BRUSHES!

You don't have to order a complete Helwig Brush Kit every time your supply of a popular brush is exhausted. Simply request the brush number you need from our nearest office. For complete kit information, write for Bulletin 65.

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Makers of Multiflex and Transert Brushes

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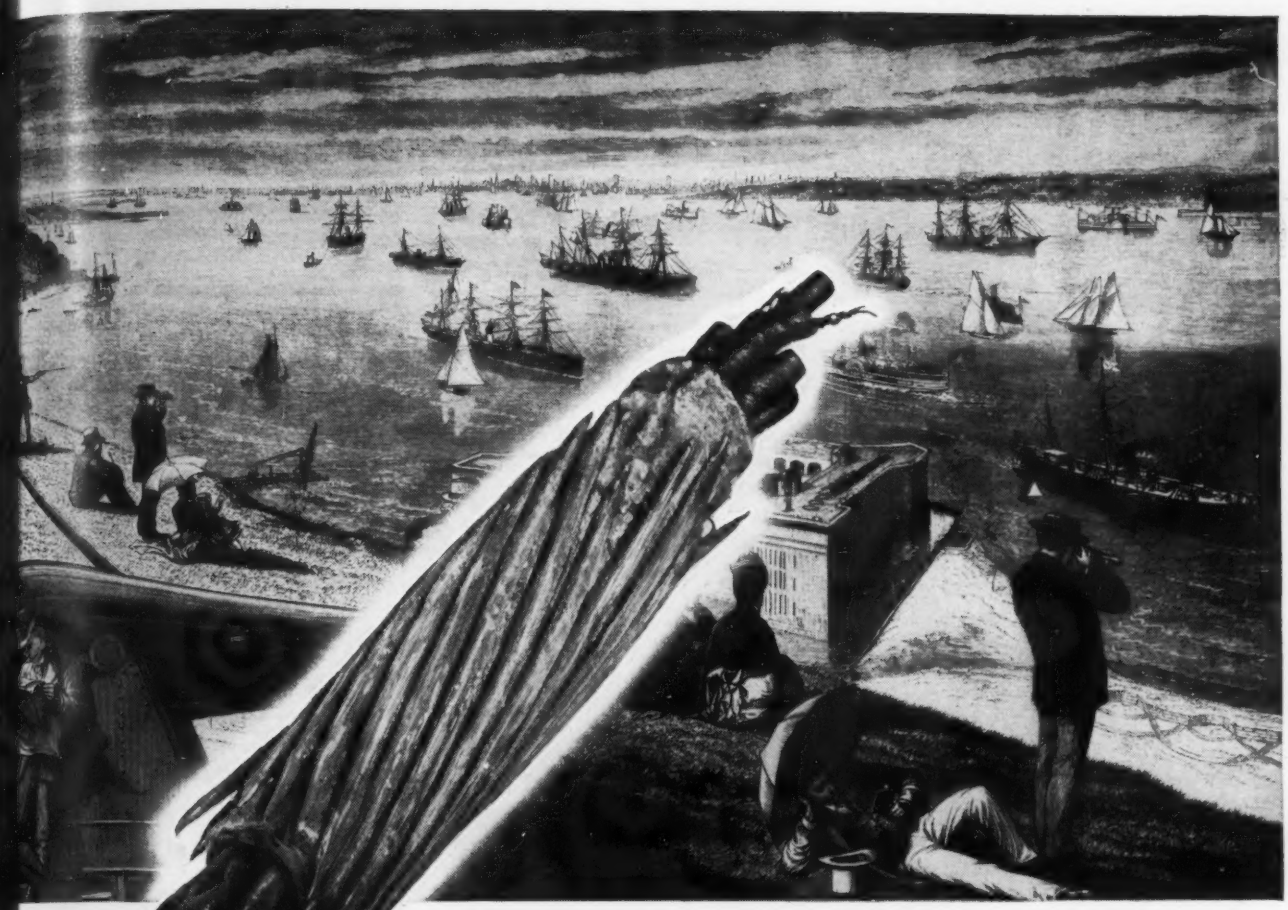
Fuses, Oilers, Clip Locks and Fuse Pullers

BURKE ELECTRIC COMPANY
Bakelite Controlead Terminal Blocks



At 66 this KERITE is still live

FROM 1883 until 1917, when it was replaced by a cable with more conductors, the Kerite non-leaded submarine cable shown above operated without a single service interruption. It was installed on a 250-volt telegraph circuit under North River, New York City, and terminated near a sewer inlet.

Although the corrosive action of the polluted water destroyed the steel wire armor, the Kerite insulation was unharmed. Made in 1881, this piece of cable has spent 34 years under water, and 32 years in air. The physical and electrical characteristics of the Kerite insulation are still excellent.

Modern Kerite cable is still insulated with Kerite made by the same time-tested formula. And modern Kerite engineering has brought many advances to the art of cable making. Kerite engineers will be glad to consult with you on your cable problems. *The Kerite Company, 30 Church Street, New York 7, N. Y.*

Offices also at: 122 S. Michigan Avenue, Chicago 3; 582 Market Street, San Francisco 4; 714 W. Olympic Blvd., Los Angeles 15.

Kerite Insulation—Your Cable's Best Life Insurance

DAYS KERITE

KERITE CABLE

Pacific Coast Representatives: Carlo Baldassari. 582 Market St., San Francisco 4
Robert A. Young & Co., 714 Olympic Blvd., Los Angeles 15

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SPECIALLY DESIGNED
MOTOR BRUSHES
MEET EVERY TEST

The *right* brush for the *right* motor or generator in the *right* place. There is no such thing as a standard brush. Identical motors or generators often do not give identical performance. Brushes must be selected in accordance with the conditions under which the machine operates. Call on our research staff for a solution to your brush problems.

West Coast Representative
TRI-STATE SUPPLY CORP.
LOS ANGELES • SAN FRANCISCO
SEATTLE

BUY YOUR CARBON BRUSHES FROM A SINGLE SOURCE

THE OHIO CARBON COMPANY
12508 BEREA ROAD
CLEVELAND 11, OHIO

NOTES ON THE TRADE

● MANUFACTURE of ten 5,000-kw. packaged power plants will be started soon in the Westinghouse works at Sunnyvale, Calif. The first four units, scheduled for completion in mid 1948, will go to Mexico, according to R. A. Neal, vice-president and general manager of the West Coast operations. The self-contained units will operate with either coal or oil, at any altitude between sea level and 6,000 ft. and at climates ranging from Arctic to tropical.

● PLANS for expanding manufacturing facilities at the Anaheim plant of the Essex Wire Corp. of California were announced recently. The expansion will permit production of a complete line of wires and cables on the Pacific Coast. It is also planned to have a Paranite wire and cable division of the Essex Corp. of California to sell wires and cables for distribution through electrical wholesalers. Robert W. Mungall is president of the California company.

● FABRICATION will begin immediately on 650 tons of structural steel for the $2,000,000 San Jose plant of General Electric, contract having been awarded to Judson-Pacific-Murphy Corp., Emeryville. Erection of the plant, which will have 500 employees and 143,000 sq. ft. of floor area, will begin in January and it is scheduled to start production on induction motors of 1-500-hp. for both general and special service by late summer of 1948.

● E. C. METCALF, electrical and mechanical consulting engineer, has opened an office in the Columbia Bank Bldg., Wenatchee, Wash. He comes from Nebraska, where he was employed by R. W. Beck and Associates, as operations engineer. He will continue his association with Beck in addition to conducting his independent engineering business. Metcalf specializes in operations of power plants and industrial machinery.

● ON TOUR of the Western states is Miss Burndy IV a traveling connector exhibit of the Burndy Engineering Co. Actual use of connectors for power installations and underground distributions are displayed by the exhibit, which was in the Northwest as this issue went to press.

Scharr

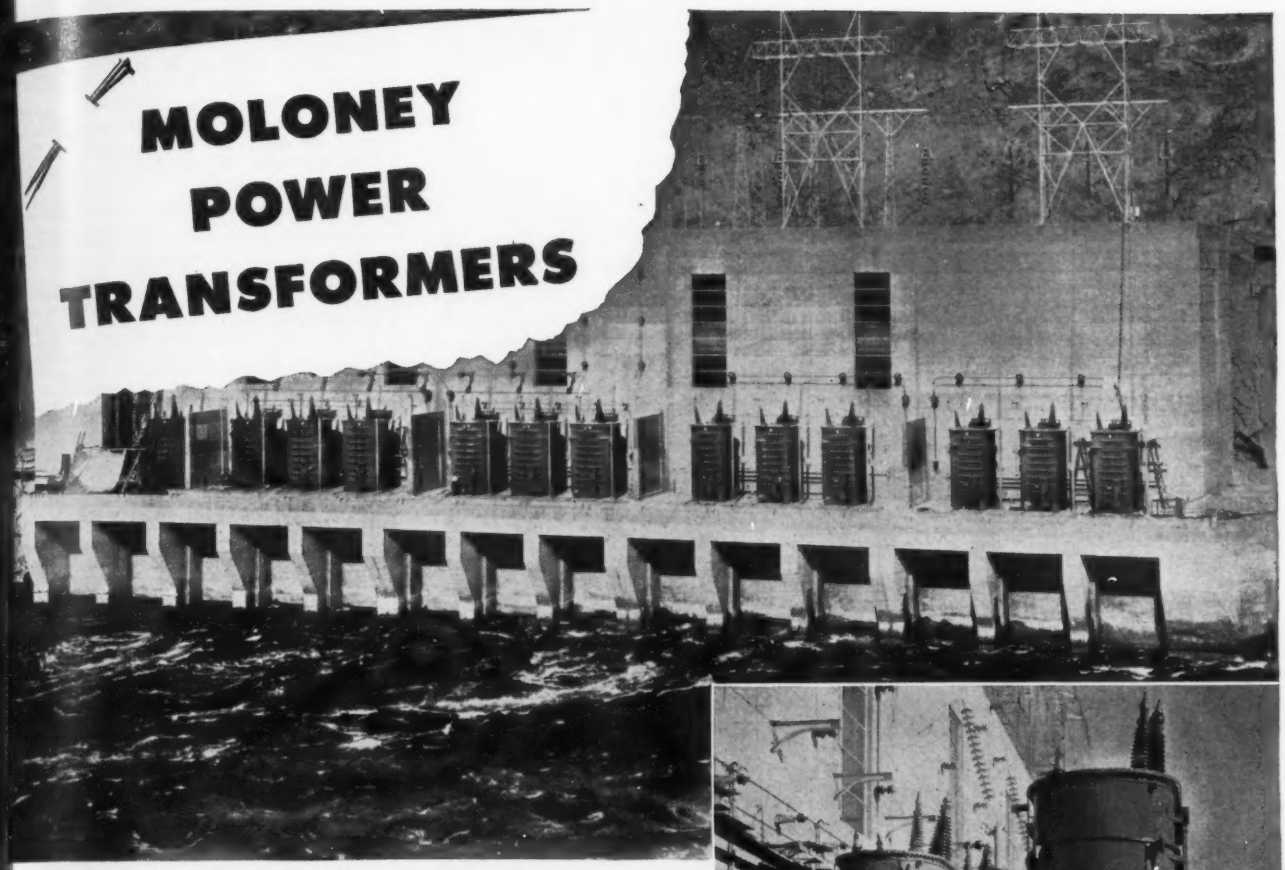
● L. A. HOBBS, vice-president and sales manager of Smoot-Holman, Inglewood, Calif., has announced organization changes within the firm. C. E. Smoot Jr. has been transferred from Seattle to San Francisco as district manager for that area. Freeman C. Scharr replaces Smoot as Northwest district manager, with offices at 25 Central Bldg., Seattle. He was formerly Pacific Coast district manager for Bryant Electric Co.

Ford

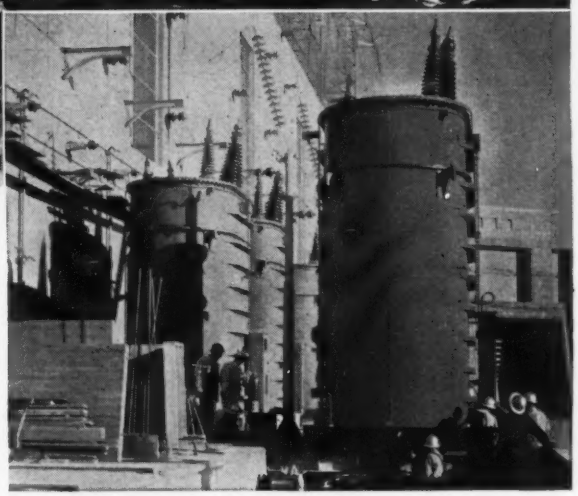
● TED FORD has joined the Earl S. Condon Co. organization, Los Angeles engineering representatives. Before the war Ford was with the Braun Corp., manufacturer of oil refinery equipment; during the war he served as a Navy lieutenant on convoy patrol.

● ESSEX WIRE CORP. of California announces that temporarily it will supply magnet wire to the motor rewind and the repair trade out of its warehouses at 2030 Sacramento St., Los Angeles and 1077 Howard St., San Francisco.

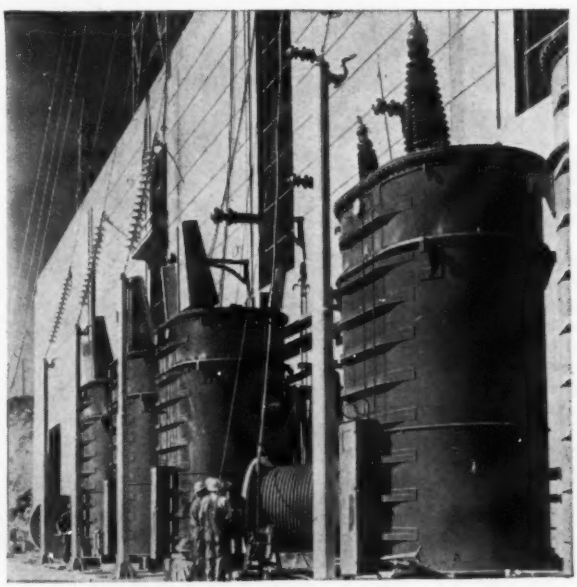
MOLONEY POWER TRANSFORMERS



Bureau of Reclamation Photos



Moving transformer into place from transfer truck.



Preparing to connect transformers for operation.

Like thousands of other Moloney Power Transformers, these 10,000 Kva water-cooled units are doing a good job 24 hours a day. Twelve of them are used at this hydro-electric plant to step up generator voltage to suitable transmission voltages. A thirteenth is used as a spare.

Nine of the transformers are rated 6800 to 92955/161000Y volts. The other four are similarly rated but have an additional 39840/69000Y volt winding of 10,000 Kva capacity, permitting a selection or combination of transmission voltages.

These transformers have been providing dependable service since 1943 and, based on past records of numerous other Moloney installations, will continue to do so for many more years. The dependability of well-designed, well-built transformers is yours when you specify Moloney.

MOLONEY ELECTRIC COMPANY

TRANSFORMERS EXCLUSIVELY SINCE 1896

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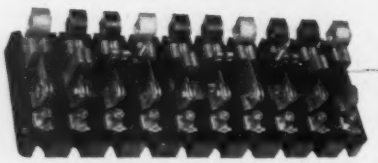

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● To Do CONSULTING work in the fields of radiant heating and electrical engineering, RICHARD W. SHOEMAKER, formerly consulting engineer for Chase Brass & Copper Co. Inc., and the Kennecott Wire & Cable Co., has set up an office at 3533 Oak Knoll Blvd., Oakland. In addition to being associated with Robert Bruen in Thermo-Radio Consultants and with Thermo-Panels Inc., Shoemaker has been appointed consulting engineer for the Oakdale Irrigation District. While connected with the Chase Co. he wrote the *Chase Electrical Handbook* and directed studies on a radiant heating manual.

● KENNETH A. SMITH has joined Primary Processes Ltd. of Los Angeles, as consultant and development director, specializing in research and installation of new applications of electronics and supersonics in food packaging, processing and sterilization. He formerly was in the physics department of U.S.C. and during the war was with the Materiel Command, Army Air Forces.

● NELSON ELECTRIC Corp. of Santa Monica, transformer manufacturer, has announced appointment of executive personnel, including George Otis, vice-president; Daniel Gage, secretary; Jack D. Phelan, sales manager; Eugene Leitner, treasurer; Henry Butz, chief engineer; H. N. Leuckel, purchasing agent. A. D. Nelson is president of the newly organized corporation.

● EDWARD M. CHISHOLM has organized the Chisholm Industries at Vancouver, B.C. The company is now turning out a 5-tube mantle radio, which is equipped with what is described as a "moisture barrier" to overcome moist climatic conditions which impair perfect fidelity in tone reproduction. The new model is now on sale in Vancouver retail and electrical stores.

● TAYLOR-RIDDELL Ltd., Ladner, B.C. has been appointed commercial refrigeration dealer by the Canadian General Electric Company Ltd.

● NEW ADDRESS for Century Electric Co. in the San Francisco territory is 557 Monadnock Bldg., 681 Market St., San Francisco 5.

AVAILABLE—Electrical Engineer, age 32, desires position in equipment application or electrical power field. Ten years' experience in design, installation, testing and maintenance of electric power plants and distribution systems. Address Box 234, Electrical West, 621 So. Hope St., Los Angeles 14, Calif.

WANTED

GRADUATE ELECTRICAL, MECHANICAL, AND STRUCTURAL ENGINEERS AND DESIGNERS for Power Station, Electrical Transmission and Distribution, and Substation Engineering, Design, and Operation. Location, Western Pennsylvania. Qualifications, experience record, and picture should be submitted with letter of application. Write Box 235, Electrical West, 68 Post St., San Francisco 4, Calif.

POSITION WANTED

Electrical Engineer—12 years' experience responsible position industrial power design; 10 years' experience public utility overhead and substations. West Coast preferred. Address Box 237 Electrical West, San Francisco 4, Calif.

ELECTRICAL ENGINEER—Twenty-seven years' experience in utilities operation, seven years as general manager of hydro and diesel system in Northwest. Now employed as plant engineer in an industrial plant. Seeks administrative position with medium or small utility, electric preferred. Fully competent to administer and operate any electric, telephone, water or gas property. Thoroughly familiar with public utility accounting, excellent public relations ability. Married, age 50 years, primary desire stability and permanency. Full confirmation of all claims will be presented to interested parties. Address Box 236, Electrical West, San Francisco 4, Calif.

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KATOLIGHT 1411 First Avenue, Mankato, Minn.

BANDOLI-McINTYRE Co., wholesale distributors, Los Angeles, recently became incorporated. In addition to its president, Marvin S. Bandoli, and vice-president, Vincent J. McIntyre, other officers in the firm include: Arnt Olson, vice-president; Chester E. Cleveland, secretary, and Edward F. Hamilton, assistant secretary. To more efficiently serve the retailers the company has organized into two divisions, the distributing division, headed by Bandoli, and the builders division, headed by Leo Wolins.

TULL AND GIBBS Inc., Spokane, has been appointed distributor of L & H Electric Ranges and Water Heaters according to an announcement made by J. Lindemann & Hoverson Co., Milwaukee. The distributorship includes the territory of eastern Washington, northern Idaho, and the northwestern Montana area.

COVERING the states of Colorado, Wyoming, New Mexico, western Kansas and Nebraska, Arnold's Sales System, Denver, has been appointed jobber and distributor for the following lines: Master Grande Portable Washers, Sub-Zero Two Temp. Refrigerators, Dewald & Watterson Radios, Munchmaster Waffle Irons.

MACLENNAN, MCFEELY & PRIOR Ltd. has purchased property on the south east corner of Carall and Cordova Sts., Vancouver, B.C., and will erect a modern retail hardware store. The new store will be used for the display of hardware, furniture, electrical appliances, radios, and sports goods.

SELENIUM CORP. of America, affiliate of Vickers Inc., has moved into a new building at 2160 E. Imperial Highway, El Segundo, Calif. The company makes selenium power and instrument rectifiers and self-generating photoelectric cells.

BEST ELECTRIC has opened new display room at 332 Sixth St., New Westminster, B.C. The firm specializes in house wiring; has had 16 years experience in this field in New Westminster.

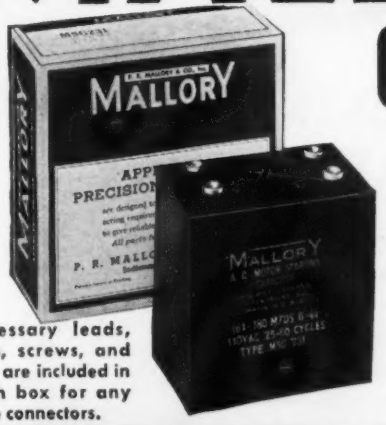
WITH offices at the Line Material Co. office in Portland, Harold Zanzow is representing the Kyle Corp. in the western states. He formerly was with the Bonneville Power Administration.

JOHN B. LANIGAN, formerly in charge of Pacific Coast sales for Eureka, has been made manager of the Eureka division with headquarters in Bloomington, Ill.

DEPEND ON—INSIST ON—

P.R. MALLORY & CO. Inc.

MALLORY CAPACITORS



Necessary leads, lugs, screws, and nuts are included in each box for any type connectors.

Mallory MSG Capacitor:—Small, compact AC Motor Starting Capacitor that fits almost every mounting bracket or box. Replaces rectangular capacitors with leads, lugs or studs. Each capacitor is packed with complete set of universal mounting hardware and installation instructions.

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LAPP LINE POSTS and STATION POSTS are the modern-appearing, modern-performing high-voltage insulators. Serve without cleaning in areas of most severe atmospheric contamination. Radio free. Puncture proof. Superior to all other designs in ability to withstand power arcover, stones and bullets.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., required by the Act of Congress of August 24, 1912, as Amended by the Acts of March 3, 1933, and July 2, 1946 of Electrical West, published monthly at Los Angeles, Calif. for October, 1947.

State of California } ss.
County of San Francisco }

Before me, a notary in and for the State and county aforesaid, personally appeared George C. Tenney, who having been duly sworn according to law deposes and says that he is the Editor of the Electrical West, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, McGraw-Hill Company of California.....68 Post St., San Francisco 4, Calif.
Editor, George C. Tenney.....68 Post St., San Francisco 4, Calif.
Managing Editor .....None
Business Manager.....Roy N. Phelan, 621 So. Hope St., Los Angeles 14, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given.)

McGraw-Hill Co. of Calif., San Francisco; McGraw-Hill Publishing Co., Inc., New York; James H. McGraw, Jr., New York City; Curtis McGraw, New York City; George C. Tenney, San Francisco, Calif.; John W. Otterson, San Francisco, Calif.; N. A. Bowers, San Francisco, Calif.; Roy N. Phelan, Los Angeles, Calif.

3. That the known bond holders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is..... (This information is required from daily, weekly, semiweekly and triweekly newspapers only.)

GEORGE C. TENNEY, Editor.

Sworn to and subscribed before me this 26th day of September, 1947.

(SEAL)

WM. E. SCHORD,
(My commission expires June 2, 1950.)

Brien

● F. T. "Ted" BRIEN is the newly a pointed executive vice-president of t Radio Television & Appliance Inc. Washington. For more than 20 ye he has been active in the electrical a pliance field serving as district m chandising manager for Graybar El tric Co., and prior to that was c nected with Frigidaire Corp. in California office.

● EASY WASHING MACHINE Co. h announced the appointment of BE NARD MORRIS as district manager the West Coast. Morris will serve u der F. S. FENTON Jr., the compan West Coast division head. Before jo ing Easy, Morris was for several ye appliance manager for Levy's depa ment stores at San Mateo and Bu lingame.

● WATTS IN GLASS, a full-color, sou motion picture portraying the role Fiberglas insulation in electrical equi ment, has been prepared by Owe Corning Fiberglas Corp. The mov which runs 25 minutes, may be cured from Owens-Corning, Film L partment, Toledo 1, Ohio.

● GILBERT BROS. Inc., Portland, cently announced that J. R. Grossm manager of its lighting fixtures and pliance division, was chosen to mak trip to Japan to survey export and port possibilities and promote busin for the company.

● R. I. INSULATED WIRE Co., In Providence, R. I., makers of Be Wire, recently named Markwood L San Francisco, as Pacific Coast m agers for its complete wire and ca line.

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Big Sales of Government Surplus Electrical Equipment & Supplies Will Be Announced SOON

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2. Electrical Fixtures
3. Fuses
4. Reflectors
5. Guards
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PROFILES

Norman V. Arntzen has been placed in charge of sales for Hubbard & Co. in southern California, Arizona and part of Nevada. He has been with Hubbard since 1926; before that he was with University of California's administrative staff, working on the design and construction of research apparatus

Norman A. Hayes has been appointe Seattle district manager for Grayb and will supervise the company's me chandising activities throughout t Northwestern district. He has be associated with the appliance busine for 25 years. Since 1945, he has be Portland Graybar merchandising he

C. E. Wilson (center) General Electric president, is greeted in San Francisco b R. M. Alvord (right) and R. W. Turnbull, who last month took over the post G-E commercial vice-president for the Pacific district, succeeding Alvord. W son was in San Francisco en route to Hanford Engineer Works, Richland, Was

85 MILLION DOLLARS WORTH *of New Sierra Powerhouses!*

HARD and heavy work is underway today along the upper reaches of the Feather, Mokelumne and Yuba Rivers. P. G. and E., at a cost of $85,000,000 is building five new hydroelectric powerhouses to add 464,000 horsepower to the power supply of Northern and Central California. Road, foundation and tunneling crews are now rushing work to beat the rains and snows of winter.

Here are the new plants, their cost and capacity:

ROCK CREEK—North fork of Feather River, to cost $35,400,000, will deliver 169,000 horsepower.

CRESTA—North fork of Feather River, to cost $26,400,000, will deliver 101,000 horsepower.

COLGATE—on the Yuba River, to cost $3,325,000, will deliver 40,000 horsepower.

ELECTRA—on the Mokelumne River, to cost $15,600,000, will deliver 133,000 horsepower.

WEST POINT—on the Mokelumne River, to cost $4,000,000, will deliver 21,000 horsepower.

These new hydroelectric plants are part of the greatest construction program in the history of P. G. and E.—a $350 million expansion plan that will add 1,000,000 electric horsepower to the company's system by 1951.

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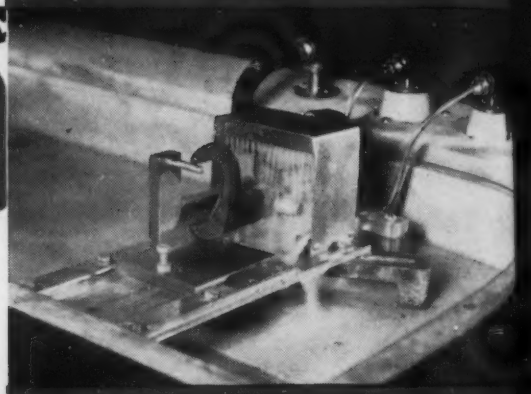
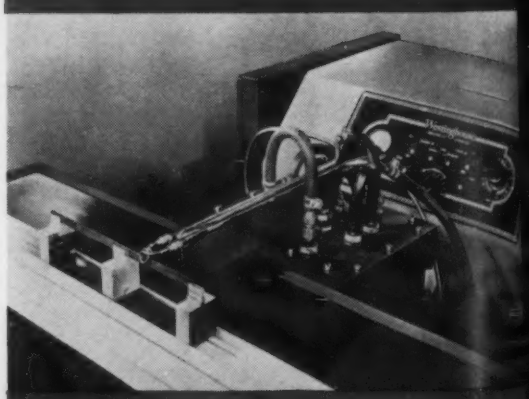
Surface hardening of metal products is easily accomplished with induction heating. The metal article is placed in the inductor coil of a radio frequency heater, current is passed through it, and surface metal becomes red hot over the desired area so quickly that heat has no time to wander off where it might do harm instead of good. When correct hardening temperature is reached, power is automatically shut off and the hot surface is quenched in water or oil. Illustrated here are but three of hundreds of applications of R. F. heating which solve surface hardening problems. For additional information see your local utility engineers.

Gear is heated in seconds by R. F. coil, then quenched in spray below. Heating and quench are automatically controlled.



Fixture for hardening a shift fork, showing application of spray quench to irregularly-shaped parts.



Hardening teeth of hack saw blades carried on conveyor belt through work coil. Rest of blade remains tough and flexible.

PACIFIC COAST ELECTRICAL ASSOCIATION

447 Sutter Street, San Francisco 8 — 601 West Fifth Street, Los Angeles 13